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U.S. DEPARTMENT OF COMMERCE
Philip M. Klutznick
Secretary of Commerce

NATIONAL TECHNICAL INFORMATION SERVICE
Melvin S. Day, Director

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GOVERNMENT REPORTS ANNOUNCEMENTS & INDEX

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FIELD 4. ATMOSPHERIC SCIENCES. Includes the following Groups: Atmospheric Physics; Meteorology.

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FIELD 18. NUCLEAR SCIENCE AND TECHNOLOGY. Includes the following Groups: Fusion Devices (Thermonuclear); Isotopes; Nuclear Explosions; Nuclear Instrumentation; Nuclear Power Plants; Radiation Shielding and Protection; Radioactive Wastes and Fission Products; Radioactivity; Reactor Engineering and Operation; Reactor Materials; Reactor Physics; Reactors (Power); Reactors (Non-power); SNAP Technology.

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FIELD 21. PROPULSION AND FUELS. Includes the following Groups: Air-breathing Engines; Combustion and Ignition; Electric Propulsion; Fuels; Jet and Gas Turbine Engines; Nuclear Propulsion; Reciprocating Engines; Rocket Motors and Engines; Rocket Propellants.

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SAMPLE ENTRIES

MAIN ENTRY

Report entries are arranged by subject group and field. Within fields they are arranged alphanumerically by NTIS order number (accession number); alphabetic data precedes numeric.

Field 10 ENERGY CONVERSION
(NON-PROPULSIVE)

Group 10A Conversion Techniques

Order number — **PB-254 315/5GA** — **PC A16/MF A01** — **Price codes**

Corporate author — Smithsonian Science Information Exchange, Inc., Washington, D.C.

Personal author — **Information on International Research and Development Activities in the Field of Energy,** David F. Hersey. May 76, 370p* NSF/RA-760057, Grant NSF-AER74-20678 — **Report title**

Keywords — descriptors & identifiers — Descriptors: *Directories, *Indexes (Documentation), *Energy, Research projects, Foreign countries, Bibliographies, Abstracts. Identifiers: Announcement bulletins.

This directory is the product of a data collection effort undertaken by the Smithsonian Science Information Exchange (SSIE) on behalf of an interagency committee formed under the U.S. State Department to provide international cooperation in energy research and development. Included is information covering 1766 ongoing and recently completed energy research projects conducted in Canada, Italy, the Federal Republic of Germany, France, the Netherlands, the United Kingdom, and 25 other countries. In addition to the title and text of project summaries, the directory contains the following indexes: Subject Index, Investigator Index, Performing Organization Index, and Supporting Organization Index. — **Abstract of report**

INDEX ENTRIES

Index entries are arranged alphanumerically. Titles are included in all indexes except the Contract Number index.

SUBJECT

ENERGY
Information on International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A

Entries are sequenced by major subject term (the keywords with an asterisk) and by NTIS order number.

PERSONAL AUTHOR

HERSEY, DAVID F.
Information in International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A

Entries are sequenced by personal author, report title, and NTIS order number.

CORPORATE AUTHOR

SMITHSONIAN SCIENCE INFORMATION EXCHANGE, INC., WASHINGTON, D.C.
Information on International Research and Development Activities in the Field of Energy.
(NSF/RA-760057)
PB-254 315/5GI 10A

Entries are sequenced by corporate author name, original report number, and NTIS order number. The monitor agency number is given following the report title.

CONTRACT GRANT NUMBER

NSF-AER74-20678
Smithsonian Science Information Exchange, Inc., Washington, D.C.
PB-254 315/5GI 10A

Entries are sequenced by contract or grant number, corporate author, and NTIS order number.

ACCESSION/REPORT NUMBER

PB-254 315/5GI
Information on International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A PC A16/MF A01

Entries are sequenced by NTIS order, original report, or monitor agency number. Price codes are given in this index.

REPORTS ANNOUNCEMENTS

1. AERONAUTICS

1A. Aerodynamics

AD-A075 104/0 PC **A02/MF A01**
Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France)
AGARD Two-Dimensional Aeroelastic Configurations.
Advisory rept.,
S. R. Bland. Aug 79, 18p Rept no. AGARD-AR-156

The aeroelastician needs reliable efficient methods for the calculation of unsteady aerodynamic forces in the frequency critical transonic speed regime. The development of such methods can be enhanced by the availability of a limited number of test cases for the comparison of competing methods. This report contains such test cases. Geometric descriptions of seven, two-dimensional airfoils and suggested aerodynamic conditions for each are included. (Author)

AD-A075 379/8 PC **A06/MF A01**
Massachusetts Inst of Tech Cambridge Acoustics and Vibration Lab
Wall Pressure Fluctuations during Transition on a Flat Plate.
Final rept. Oct 76-Apr 79,
Charles Joseph Gedney. Apr 79, 114p Rept no. A/V-84618-1
Contract N00014-77-C-0084

Detailed measurements of wall pressure fluctuations have been made in the intermittent region of a flat plate boundary layer. Digital sampling and processing were used. The properties of these pressure fluctuations were found to be similar to the previous measurements made in the fully turbulent region. The measurements were repeated with a single two dimensional surface roughness on the plate. The only changes in the results were a decrease in the transition Reynolds number from 2.0 to 1.2 million per foot and an increase in the decay rate of the longitudinal cross-spectral density magnitude by a factor of about 1.5. Emmons' analytical model of the burst rate in the transition region was found to be inaccurate. His model treats the sources of the turbulent spots as independent random events with prescribed probability density functions. Both a delta function and a constant were used as the source density functions and in each case the burst rate was about two times higher than the present measurements. (Author)

AD-A075 403/6 PC **A05/MF A01**
Boeing Aerospace Co Seattle Wa Boeing Military Airplane Development Organization
Formulation of the Three Dimensional Transonic Unsteady Aerodynamic Problem.
Interim rept. 15 May 78-15 Feb 79,
H. Yoshihara. Feb 79, 87p AFFDL-TR-79-3030
Contract F33615-78-C-3201

Unsteady transonic flow for a swept wing of moderate sweep is formulated in the small disturbance limit. Boundary conditions at the wing, the trailing vortex sheet, and the outer computatinal boundaries are given including the ventilated wall conditions. Shortcomings of the small disturbance hypothesis is reviewed, suggesting means to compensate for them. Viscous interactions are described together with procedures to incorporate their effects. (Author)

AD-A075 419/2 PC **A08/MF A01**
Air Force Academy Co
Air Force Academy Aeronautics Digest. Spring 1979.
Final rept.,
E. J. Jumper , and M. M. Tower. Jul 79, 167p Rept no. USAFA-TR-79-7

This digest covers unclassified research in aeronautics performed at the United States Air Force Academy during the six months ending 1 July 1979. This report includes individual technical papers in the specific areas of aerodynamics, fluid mechanics, experimental instrumentation, engineering education and thermodynamics and heat transfer. (Author)

AD-A075 526/4 PC **A03/MF A01**
Arnold Engineering Development Center Arnold Afs TN
Real-Gas Effects on the Aerodynamics of Blunt Cones as Measured in a Hypervelocity Range.
Final rept. Jul 75-Oct 78,
C. J. Welsh , W. R. Lawrence , and R. M. Watt. Oct 79, 30p Rept no. AEDC-TR-79-33
Prepared in cooperation with ARO, Inc., Tullahoma, TN.

A 1,000-ft hypervelocity range was used in a free-flight investigation of real-gas effects on the aerodynamics of blunted 10-deg semiangle cones. The tests were made using nitrogen and air test environments at a nominal velocity of 16,000 fps and at Reynolds number levels (based on model length and free-stream conditions) of about 400,000 and 2,000,000. Measurements indicate appreciable real-gas effects in the center-of-pressure and moment data. A discussion is also included of a new data reduction procedure devised to reduce nonlinear static stability data from small amplitude nonlinear motion histories. (Author)

N79-32150/1 PC **E02**
National Aeronautics and Space Administration, Washington, DC.
Aeronautical Engineering. A Continuing Bibliography, Supplement 112.
Aug 79, 124p NASA-SP-7037(112)

This bibliography lists 424 reports, articles, and other documents introduced into the NASA scientific and technical information system in July 1979.

N79-32156/8 PC **A03/MF A01**
Jet Propulsion Lab., Pasadena, Calif.
Aircraft Vortex Marking Program.
Final Report.
M. F. Pompa. 1 Oct 79, 47p NASA-CR-162299, JPL-PUB-79-77
Contract NAS7-100

A simple, reliable device for identifying atmospheric vortices, principally as generated by in-flight aircraft and with emphasis on the use of nonpolluting aerosols for marking by injection into such vortex (-ices) is presented. The refractive index and droplet size were determined from an analysis of aerosol optical and transport properties as the most significant parameters in effecting vortex optimum light scattering (for visual sighting) and visual persistency of at least 300 sec. The analysis also showed that a steam-ejected tetraethylene glycol aerosol with droplet size near 1 micron and refractive index of approximately 1.45 could be a promising candidate for vortex marking. A marking aerosol was successfully generated with the steam-tetraethylene glycol mixture from breadboard system hardware. A compact 25 lb/f thrust (nominal) H2O2 rocket chamber was the key component of the system which produced the required steam by catalytic decomposition of the supplied H2O2.

N79-32157/6 PC **A03/MF A01**
McDonnell Aircraft Co., St. Louis, Mo.
Multi-Element Airfoil Viscous-Inviscid Interactions.
Final Report.
L. W. Gross. 1979, 28p NASA-CR-159125
Contract NAS1-15369

Subsonic viscous-inviscid interactions for multi-element airfoils are predicted by iterating between inviscid and viscous solutions until the performance coefficients converge. Inviscid flow is modelled by using distributed source-vortex singularities on configuration surface panels. Viscous effects are calculated by an existing laminar separation bubble model and a NASA-Lockheed boundary layer-wake method. Numerical formulations and example calculations are presented.

N79-32158/4 PC **A03/MF A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Effect of Outboard Vertical-Fin Position and Orientation on the Low-Speed Aerodynamic Performance of Highly Swept Wings.
V. S. Johnson, and P. L. Coe, Jr. Sep 79, 30p NASA-TM-80142

A theoretical study was conducted to determine the potential low-speed performance improvements which can be achieved by altering the position and orientation of the outboard vertical fins of low-aspect-ratio highly swept wings. Results show that the magnitude of the performance improvements is solely a function of the span-load distribution. Both the vertical-fin-chordwise position and toe angle provided effective means for adjusting the overall span-load distribution.

N79-32162/6 PC **A06/MF A01**
Boeing Commercial Airplane Co., Seattle, Wash.
Random Harmonic Analysis Program, L221 (TEV156). Volume 2: Supplemental System Design and Maintenenace Document.
M. L. Graham, R. E. Clemmons, and R. D. Miller. Sep 79, 113p NASA-CR-2858, D6-44467-V-2
Contract NAS1-13918

Volume 2 of a two volume document is presented. A computer program, L221 (TEV 156), available for execution on the CDC 6600 computer, is described. The program is capable of calculating steady-state solutions for linear second-order differential equations due to sinusoidal forcing functions. From this, steady-state solutions, generalized coordinates, and load frequency responses may be determined. Statistical characteristics of loads for the forcing function spectral shape may also be calculated using random harmonic analysis techniques. The particular field of application of the program is the analysis of airplane response and loads due to continuous random air turbulence.

N79-32163/4 PC **A06/MF A01**
Boeing Commercial Airplane Co., Seattle, Wash.
A Program to Compute Three-Dimensional Subsonic Unsteady Aerodynamic Characteristics Using the Doublet Lattic Method, L216 (Dublfix). Volume 1: Engineering and Usage.
Topical Report, May 1975 - May 1977.
M. Richard, and B. A. Harrison. Oct 79, 123p NASA-CR-2849, D6-44458-V-1
Contract NAS1-13918

The program input presented consists of configuration geometry, aerodynamic parameters, and modal data; output includes element geometry, pressure difference distributions, integrated aerodynamic coefficients, stability derivatives, generalized aerodynamic forces, and aerodynamic influence coefficient matrices. Optionally, modal data may be input on magnetic file (tape or disk), and certain geometric and aerodynamic output may be saved for subsequent use.

N79-32175/8 PC **A05/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
Windtunnel Measurements on the Interference Between a Jet and a Wing Located Outside the Jet. Part 1: Text, Tables, and Figures.
Y. G. Kho. 9 Feb 79, 93p NLR-TR-77009-U
Contract NIVR-1761

A windtunnel investigation on the interference between a jet and a wing half model located outside the jet is described. Pressure distributions on the wing and lift coefficients calculated from then were used for evaluation of a method for the prediction of interference effects between jets and parts of airframes. A reduction of lift is found due to the jet below the wing, whereas the jet above the wing induces more lift, sometimes even leading to early separation and stall. Also for comparison with calculated cross sectional jet areas, contours of the jet were estimated at two stations behind the nozzle exit.

N79-32176/6 PC **A03/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
Calculation of the Flow around a Swept Wing, Taking into Account the Effect of the Three-Dimensional Boundary Layer. Part 2: Wing with Laminar Boundary Layer on the Lower Surface.
B. Vandenberg, W. J. Piers, and E. Deboer. 9 Feb 79, 26p NLR-TR-77066-U
Contract NIVR-1737

The attached flow around a swept wing was calculated with allowance for the effects of boundary layer and wake. Calculations for a swept wing with

a laminar lower surface boundary layer were compared with experimental data. The comparison reveals that the viscous lift loss is less well predicted than for the case of a swept wing with a turbulent boundary on the upper and lower surface due to an existing uncertainty about the state of the lower surface boundary layer near the trailing edge.

N79-32177/4 PC **A04**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
Experimental Investigation of the Aerodynamic Characteristics of a Wing in a Jet Flow.
T. Zandbergen, R. A. Maarsingh, and C. J. J. Joosen. 9 Feb 79, 75p NLR-TR-77081-U
Contract NIVR-1768

To test the qualities of the theoretical models used in two different calculation methods, pressure distributions were measured on a simple half-model wing-in-jet combination. The position of the jets relative to the wing was varied, mainly in a plane perpendicular to the span. Jet velocities of one, two, and three times the tunnel velocity were used. The wing model was used with and without a small, full-span auxiliary airfoil flap deflected at 30 deg. Results indicate that data from this test setup are appropriate for evaluating methods for calculating the distributed and total (integrated) lift on wings, and that a very complete picture of jet induced effects can be obtained.

N79-32178/2 PC **A08**/MF **A01**
Royal Aircraft Establishment, Bedford (England). Aerodynamics Dept.
Aerodynamic Data for Three Supercritical Airfoils: RAE(NPL)9515 and 9530, and RAE 9550. Parts 1 and 2.
J. L. Fulker. 1978, 153p ARC-R/M-3820, BR67756
Misc-Previously Announced as ARC-R/M-36198 and ARC-R/M-36262 (RAE-TR-74082 and RAE-TR-75068).

The experimentally determined aerodynamic characteristics of two 10.5% thick supercritical airflow sections, (RAE(NPL)9515 and 9530) are compared, over the Mach number range 0.3 to 0.88 and with angles of incidence from -0.82 to 14. The corresponding results for RAE 9550, a 12.2% thick supercritical airfoil derived form an NLR shockless filting airfoil, from tests over the Mach number range 0.4 to 0.82 and with angles of incidence from 1 deg to 11 deg are given. The results are compared with theory and with the limited published results for an airfoil of a similar type.

N79-32179/0 PC **A06**/MF **A01**
Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
Wind Tunnel Tests on Cambered Wings of Mild Gothic Planform. Part 1: Further Low Speed Tests. Part 2: Transonic Tests.
P. J. Butterworth, and P. Lee. Feb 78, 113p ARC-R/M-3827, BR67755
Misc-Previously Announced as ARC-R/M-37556 and ARC-R/M-37523 (RAE-TR-77018 and RAE-TR-77006).

The low-speed, longitudinal characteristics were investigated for five cambered and two symmetric wings of mild gothic planform. These were designed, using a linear theory, for attached leading-edge flow at the low values of lift coefficient typical of the cruise of slender aircraft. The purpose of the investigation was to check that cambered wings designed in this way can produce, at the higher lift coefficients appropriate to take-off, substantial reductions in drag relative to a symmetric wing. The wings all had thickness/chord ratios of 0.09 or 0.004. The cambered wings were designed to have attached leading-edge flow at various values of lift coefficient and position of the center of pressure. The force-measurement and flow-visualization tests show that the design criteria were almost achieved, although inboard separations were observed under transition-free flow conditions. However, roughness bands applied near the leading edges suppressed these separations and the force results which are analyzed in detail were all obtained with boundary-layer transition fixed.

N79-32180/8 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Div. of Fluid Dynamics.
The Design and Aerodynamic Characteristics of an 18% Thick Shock-Free Airfoil (Nlr 7501).
J. A. Vanegmond, and D. Rozendal. 5 Jun 78, 27p NLR-MP-78016-U
Conf-Presented at Dglr/Garteur 6 Symp. On Transonic Configurations, Bad Harzburg, Germany, F.R., 13-15 Jun. 1978.

The design and experimental verification of a thick (18%), shock free airfoil is described. The design was performed using the hodograph theory for transonic airfoil design. The airfoil was experimentally investigated in a pilot tunnel. Off-design characteristics compare well with thinner airfoils. However, drag levels are much higher, mainly as a result of boundary layer separation at the trailing edge.

N79-32498/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Longitudinal Vortices in a Transitioning Boundary Layer.
J. B. Anders, and R. F. Blackwelder. Sep 79, 12p NASA-TM-80161

Naturally occurring spanwise variations of the streamwise velocity component, characteristic of longitudinal vortices embedded in a transitioning boundary layer were explored using hot-wire anemometers. A vibrating ribbon introduced stable or unstable Tollmien-Schlichting waves into the laminar boundary layer. These damped or growing disturbances always developed a strong three dimensional pattern even though no spanwise perturbations were artificially induced. Changing the radius of the leading edge and other modifications to the flat plate, wind tunnel and boundary layer did not alter the spanwise wavelength of the vortices.

N79-32500/7 PC **A07**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Velocity Field of a Round Jet in a Cross Flow for Various Jet Injection Angles and Velocity Ratios.
R. L. Fearn, and R. P. Weston. Oct 79, 134p NASA-TP-1506, L-12775

A subsonic round jet injected from a flat plate into a subsonic crosswind of the same temperature was investigated. Velocity and pressure measurements in planes perpendicular to the path of the jet were made for nominal jet injection angles of 45 deg, 60 deg, 75 deg, 90 deg, and 105 deg and for jet/cross flow velocity ratios of four and eight. The velocity measurements were obtained to infer the properties of the vortex pair associated with a jet in a cross flow. Jet centerline and vortex trajectories were determined and fit with an empirical equation that includes the effects of jet injection angle, jet core length, and jet/cross flow velocity ratios.

N79-32519/7 PC **A08**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands).
European Research Program on Viscous Flows (EUROVISC).
Annual Report.
B. Vandenberg, J. Cousteix, T. K. Fanneloep, E. H. Hirschel, and P. D. Smith. Oct 78, 169p NLR-MP-78033-U

Research activities on viscous flow problems in various countries in Europe are summarized. The research included is intended to be confined to viscous flow, which may be expected to lead to aeronautical applications. Comments on the research activities are given on the basis of the information given by the individual research workers. Besides these comments describing the various investigations in progress, comments of a general nature on a specific subject, viz. transition from laminar to turbulent flow are included.

N79-33150/0 PC **A07**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.v., Cologne (Germany, F.R.).
Scientific Research, 1977 Jahresbericht 1977.
Annual Report.
1978, 149p
Misc-Original Contains Color Illustrations. Language in German.

Language in German.

A general overview of technology developments in air transportation, aircraft design, space flight technology, reconnaissance, and energy and propulsion systems is given. Specific topics covered include: (1) future systems, safety, and guided flights; (2) models of pilot-cabin interfaces, aerodynamics, aeronautics, control systems including auromatic control, missiles, rotary wings, and weight reduction; (3) intelligence, target recognition, and underwater techniques; (4) probes and space laboratories; and (5) turbogenerators, noise reduction, reduction of emissions, and high energy lasers.

N79-33152/6 PC **E02**
National Aeronautics and Space Administration, Washington, D. C.
Aeronautical Engineering: A Continuing Bibliography with Indexes, Supplement 113, September 1979.
Sep 79, 127p NASA-SP-7037(113)

This bibliography lists 436 reports, articles, and other documents introduced into the NASA scientific and technical information system in August 1979.

N79-33153/4 PC **E02**
National Aeronautics and Space Administration, Washington, D. C.
Aeronautical Engineering: A Continuing Bibliography with Indexes, Supplement 111, July 1979.
Jul 79, 162p NASA-SP-7037(111)

This bibliography lists 570 reports, articles, and other documents introduced into the NASA scientific and technical information system in June 1979.

N79-33159/1 PC **A05**/MF **A01**
National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
Flight Determined Lift and Drag Characteristics of an F-8 Airplane Modified with a Supercritical Wing with Comparison to Wind-Tunnel Results.
J. S. Pyle, and L. L. Steers. Jun 75, 87p NASA-TM-X-3250, H-843

Flight measurements obtained with a TF-8A airplane modified with a supercritical wing are presented for altitudes from 7.6 kilometers (25,000 feet) to 13.7 kilometers (45,000 feet), Mach numbers from 0.6 to 1.2, and Reynolds numbers from 0.8 x 10 to the 7th power to 2.3 x 10 to the 7th power. Flight results for the airplane with and without area-rule fuselage fairings are compared. The techniques used to determine the lift and drag characteristics of the airplane are discussed. Flight data are compared with wind-tunnel model results, where applicable.

N79-33160/9 PC **A06**/MF **A01**
Boeing Commercial Airplane Co., Seattle, Wash.
DYLOFLEX Modifications to FLEXSTAB. Volume 2: User's Manual. Volume 3: Programmer's Manual.
Contractor Report, May 1975 - May 1977.
P. Dauria. Oct 79, 123p NASA-CR-2863, D6-44472-V-2
Contract NAS1-13918

The changes made to the SD and SS program of the FLEXSTAB computer program system which allows it to be interfaced with the DYLOFLEX program system are described. The changes to specific pages in the FLEXSTAB user's manual are presented. The changes to specific pages in the FLEXSTAB programmer's manual are described. The changes were made for compatibility with the DYLOFLEX and were made in the 2.01 FLEXSTAB SD and SS program.

N79-33161/7 PC **A04**/MF **A01**
Scientific Research Associates, Inc., Glastonbury, Conn.
A Compressible Solution of the Navier-Stokes Equations for Turbulent Flow About an Airfoil.
Progress Report.
S. J. Shamroth, and H. J. Gibeling. Oct 79, 67p NASA-CR-3183

Contract NAS1-15214
Subm-Sponsored in Part by Army Research and Technology Labs.

A compressible time dependent solution of the Navier-Stokes equations including a transition turbulence model is obtained for the isolated airfoil flow field problem. The equations are solved by a consistently split linearized block implicit scheme. A nonorthogonal body-fitted coordinate system is used which has maximum resolution near the airfoil surface and in the region of the airfoil leading edge. The transition turbulence model is based upon the turbulence kinetic energy equation and predicts regions of laminar, transitional, and turbulent flow. Mean flow field and turbulence field results are presented for an NACA 0012 airfoil at zero and nonzero incidence angles of Reynolds number up to one million and low subsonic Mach numbers.

N79-33162/5 PC **A05**/MF **A01**
Scientific Research Associates, Inc., Glastonbury, Conn.
A Viscous Flow Analysis for the Tip Vortex Generation Process.
S. J. Shamroth, and W. R. Briley. Oct 79, 77p NASA-CR-3184
Contract NAS1-14904

A three dimensional, forward-marching, viscous flow analysis is applied to the tip vortex generation problem. The equations include a streamwise momentum equation, a streamwise vorticity equation, a continuity equation, and a secondary flow stream function equation. The numerical method used combines a consistently split linearized scheme for parabolic equations with a scalar iterative ADI scheme for elliptic equations. The analysis is used to identify the source of the tip vortex generation process, as well as to obtain detailed flow results for a rectangular planform wing immersed in a high Reynolds number free stream at 6 degree incidence.

N79-33163/3 PC **A15**/MF **A01**
Bihrle Applied Research, Inc., Jericho, N. Y.
Rotary Balance Data for a Typical Single-Engine General Aviation Design for an Angle-of-Attack Range of 8 Deg to 90 Deg. 2: Low-Wing Model B.
W. Bihrle, Jr., and R. S. Hultberg. Sep 79, 345p NASA-CR-3098
Contract NAS1-14849

Aerodynamic characteristics obtained in a rotational flow environment utilizing a rotary balance located in the spin tunnel are presented in plotted form for a 1/6.5 scale, single engine, low wing, general aviation airplane model. The configurations tested included the basic airplane, various wing leading-edge devices, tail designs, and rudder control settings as well as airplane components. Data are presented without analysis for an angle-of-attack range of 8 deg to 90 deg and clockwise and counter-clockwise rotations covering an (omega)(b)/2V range from 0 to 0.85.

N79-33164/1 PC **A07**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Longitudinal Aerodynamic Characteristics of a Vectored-Engine-over-Wing Configuration at Subsonic Speeds.
L. D. Leavitt. Oct 79, 136p NASA-TP-1533, L-13108

The Langley V/STOL tunnel was used to determine the effects of vectoring exhaust flow on the longitudinal aerodynamic characteristics of a vectored-engine-over-wing configuration. Vectoring was accomplished by blowing from over-wing-mounted engines over a variable trailing-edge flap. Effects of varying canard geometry and wing leading-edge geometry were investigated. Wind-tunnel data were obtained at a Mach number of 0.186 for an angle-of-attack range from -20 deg to 24 deg and engine nozzle pressure ratios from 1.0 (jet off) to approximately 3.75.

N79-33165/8 PC **A08**/MF **A01**
Boeing Commercial Airplane Co., Seattle, Wash.
A Computer Program to Generate Equations of Motion Matrices, L217 (EOM). Volume 1: Engineering and Usage.
Final Report.
R. I. Kroll, and R. E. Clemmons. Oct 79, 161p NASA-CR-2851, D6-44460
Contract NAS1-13918

The equations of motion program L217 formulates the matrix coefficients for a set of second order linear differential equations that describe the motion of an airplane relative to its level equilibrium flight condition. Aerodynamic data from FLEXSTAB or Doublet Lattice (L216) programs can be used to derive the equations for quasi-steady or full unsteady aerodynamics. The data manipulation and the matrix coefficient formulation are described.

N79-33166/6 PC **A09**/MF **A01**
Boeing Commercial Airplane Co., Seattle, Wash.
A Computer Program to Generate Equations of Motion Matrices, L217 (EOM). Volume 2: Supplemental System Design and Maintenance Document.
Topical Report, May 1975 - May 1977.
R. E. Clemmons, and R. I. Kroll. Oct 79, 180p NASA-CR-2852, D6-44461-V-2
Contract NAS1-13918

The equations of motion program L217 (EOM) is described. The program formulates the matrix coefficients for a second order linear differential equation which describes the motion of an airplane relative to its level equilibrium flight condition. Aerodynamic data from FLEXSTAB or Doublet Lattice (L216) programs are used to derive the equations for quasi-steady or complete unsteady aerodynamics.

N79-33167/4 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
Wind-Tunnel Investigation of a Large-Scale VTOL Aircraft Model with Wing Root and Wing Thrust Augmentors.
K. Aoyagi, and T. N. Aiken. Sep 79, 60p NASA-TM-78589, A-7823

Tests were conducted in the Ames 40 by 80 foot wind tunnel to determine the aerodynamic characteristics of a large-scale V/STOL aircraft model with thrust augmentors. The model had a double-delta wing of aspect ratio 1.65 with augmentors located in the wing root and the wing trailing edge. The supply air for the augmentor primary nozzles was provided by the YJ-97 turbojet engine. The airflow was apportioned approximately 74 percent to the wing root augmentor and 24 percent to wing augmentor. Results were obtained at several trailing-edge flap deflections with the nozzle jet-momentum coefficients ranging from 0 to 7.9. Three-component longitudinal data are presented with the agumentor operating with and without the horizontal tail. A limited amount of six component data are also presented.

N79-33335/7 PC **A06**/MF **A01**
Pennsylvania State Univ., University Park.
Evaluation of a Locally Homogeneous Model of Spray Evaporation.
Final Report.
A. J. Shearer, and G. M. Faeth. Oct 79, 113p NASA-CR-3198
Contract NGR-39-009-077

A model of spray evaporation which employs a second-order turbulence model in conjunction with the locally homogeneous flow approximation, which implies infinitely fast interphase transport rates is presented. Measurements to test the model were completed for single phase constant and variable density jets, as well as an evaporating spray in stagnant air. Profiles of mean velocity, composition, temperature and drop size distribution as well as velocity fluctuations and Reynolds stress, were measured within the spray. Predictions were in agreement with measurements in single phase flows and also with many characteristics of the spray, e.g. flow width, radial profiles of mean and turbulent quantities, and the axial rate of decay of mean velocity and mixture fraction.

N79-33435/5 PC **A04**/MF **A01**
Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
Vki Short Course on Turbulent Boundary Layers, March 4-15, 1968. Part 1: Introduction to Turbulent Boundary Layer Calculation.
J. C. Rotta. Mar 68, 70p VKI-LECTURE-Ser-5-PT-1

Turbulent boundary layers in a steady compressible flow on a plane, an impermeable wall, and on bodies of revolution in axial flow are examined with emphasis on the represention of the fundamental phenomena which form the basis for the treatment of more general cases. Topics dicussed include the principles of boundary layer theory; mechanics of turbulent shear flow; general behavior of turbulent boundary layers in incompressible flow and their calculation; and turbulent layers with heat transfer and incompressible flow.

N79-33437/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Some Recent Developments in the Prediction of Shock Interaction Phenomena at Hypersonic Speeds.
D. H. Crawford. Oct 79, 41p NASA-TM-80115, L-12669

The shock strengths for which either Edney type I or type II shock interference patterns can occur when two oblique shocks of opposite families intersect were determined graphically at Mach 10 by using logarithmic shock polar diagrams. The theoretical region of overlap for the two types of interaction was investigated by observing in the Schlieren system of the Langley 15-inch hypersonic flow apparatus the intersection of oblique shocks generated by two sharp 10 degree wedges as the wedge angles of attack and their relative positions were altered. A range of shock strengths for which either of the two interference patterns can exist was demonstrated.

N79-33438/9 PC **A15**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Survey and Bibliography on Attainment of Laminar Flow Control in Air Using Pressure Gradient and Suction, Volume 1.
D. M. Bushnell, and M. H. Tuttle. Sep 79, 346p NASA-RP-1035, L-12526

A survey was conducted and a bibliography compiled on attainment of laminar flow in air through the use of favorable pressure gradient and suction. This report contains the survey, summaries of data for both ground and flight experiments, and abstracts of referenced reports. Much early information is also included which may be of some immediate use as background material for LFC applications.

N79-33440/5 PC **A03**/MF **A01**
Illinois Inst. of Tech., Chicago.
Evaluation of a New Concept for Reducing Free-Stream Turbulence in Wind Tunnels.
R. A. Wigeland, J. Tan-atichat, and H. M. Nagib. Oct 79, 49p NASA-CR-3196, R79-1
Grant NSG-1451

The feasibility of using a 45 deg-honeycomb for improving the flow quality in wind tunnels was investigated. The results of the experiments indicate that the turbulence levels in a wind tunnel using the 45 deg-honeycomb would be comparable to those obtainable using a conventional honeycomb, i.e., a honeycomb which is positioned normal to the mean flow in the settling chamber. However, this is true only when a 45 deg-screen is mounted immediately downstream of the honeycomb, and when some distance is provided between the trailing edges of the corner turning vanes and the upstream side of the 45 deg-honeycomb. This distance is required for adequate decay of the turning-vane wakes, thereby providing a reasonably uniform mean flow entering the honeycomb. Results demonstrate that this distance should be at least twice the spacing between the turning vanes. Even though the resulting turbulence intensity is the same downstream of both the 45 deg-honeycomb and the conventional honeycomb, there would have to be a significant improvement in the test-section turbulence intensity using the 45 deg-honeycomb to justify the additional expense in fabricating and installing this type of honeycomb.

N79-33441/3 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

Field 1—AERONAUTICS

Group 1A—Aerodynamics

A Hybridized Method for Computing High-Reynolds-Number Hypersonic Flow About Blunt Bodies.
K. J. Weilmuenster, and H. H. Hamilton, Ii. Oct 79, 49p NASA-TP-1497, L-12946

A hybridized method for computing the flow about blunt bodies is presented. In this method the flow field is split into its viscid and inviscid parts. The forebody flow field about a parabolic body is computed. For the viscous solution, the Navier-Stokes equations are solved on orthogonal parabolic coordinates using explicit finite differencing. The inviscid flow is determined by using a Moretti type scheme in which the Euler equations are solved, using explicit finite differences, on a nonorthogonal coordinate system which uses the bow shock as an outer boundary. The two solutions are coupled along a common data line and are marched together in time until a converged solution is obtained. Computed results, when compared with experimental and analytical results, indicate the method works well over a wide range of Reynolds numbers and Mach numbers.

N79-33926/3 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Application of a Numerical Orthogonal Coordinate Generator to Axisymmetric Blunt Bodies.
R. A. Graves, Jr.. Oct 79, 42p NASA-TM-80131, L-13109

An application of a simple numerical technique which allows for the rapid construction of orthogonal coordinate systems about axisymmetric blunt bodies is presented. This technique can generate orthogonal meshes which have unequally spaced points in two directions. Relations are given for the numerical generation of the metric coefficients. Body shapes ranging from simple analytical bodies to complex reverse curvature bodies are presented together with their orthogonal coordinate systems. The relatively good accuracy of the technique is shown in tabular data describing coordinate line slopes and metric coefficients. The predictor-corrector numerical method used to generate these results is both simple in concept and easy to program, so that the application of the technique should be broader than the results presented.

1B. Aeronautics

AD-A075 382/2 PC **A05**/MF **A01**
Federal Aviation Administration Washington DC Office of Aviation Policy
FAA Aviation Forecasts; Fiscal Years 1980 - 1991.
Sep 79, 91p Rept no. FAA-AVP-79-9

The Official Federal Aviation Administration (FAA) forecasts of domestic aviation activity for the years 1980 to 1991 are presented in this volume. It contains forecasts of aviation activity at FAA towered airports and Air Route Traffic Control Centers, as well as services provided by flight service stations. Aviation activity forecasts for the four major users of the National Airspace System--the trunk and local air carriers, the air taxi and commuter air carriers, general aviation, and the military--also are presented. (Author)

AD-A075 548/8 PC **A04**/MF **A01**
Federal Aviation Administration Washington DC Office of Public Affairs
Guide to Federal Aviation Administration Publications.
Jun 79, 73p Rept no. FAA-APA-PG-2

The FAA publishes numerous documents dealing with a variety of subjects-from regulations on aviation safety to career guidance materials designed to enrich aviaiton curricula and promote interest in aviation careers. Many of these publications are of interest to the general public as well as to the aviation community. Many of them are free on request. We hope this guide makes it easier for the public to gain access to them and to the civil aviation-related publications issued by other Federal agencies.

AD-A075 611/4 PC **A08**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City NJ
Accident Data Systems Study Requirements Analysis for an FAA Accident Data System.
Final rept. Oct 77-Jul 79,
Ellis V. Couch, Ron M. Hill, Ted Kolankiewicz, and Gerald Skelton. Aug 79, 168p Rept no. FAA-NA-79-172

The Federal Aviation Administration (FAA) is investigating possible improvements in its accident data system to enhance aviation safety. The present data system is limited in scope, difficult to use, and of little benefit to aviation safety analysts. This requirements report analyzes the immediate needs which can be met in the near term as well as improvements which will necessitate extensive changes in data collection forms, procedures, and methodologies. This analysis includes an examination of other similar data systems, a review of previous related studies, and a survey of recommendations from users of accident data systems. The FAA Flight Standards Service has incorporated additional data elements, improved software for better data access, and other near term improvements in the General Aviation Accident Data System (GAADS) now under development. These improvements are evolutionary steps toward the fulfillment of the long range requirements. (Author)

N79-32186/5 PC **A04**/MF **A01**
Melbourne Univ., Carlton (Australia). Coll. of Optometry.
Recognition of the Aircraft Navigation Light Colour Code.
K. J. Bowman, and B. L. Cole. Sep 79, 69p

The sources of visual information for determining the risk of collision were examined and it was found that the navigation light system can serve as a crude screening method enabling categorization of intruder aircraft into 'potential threat' and 'no threat' categories. It was noted that the minimum intensities for navigation signals afford only a limited visual range which might be further reduced by high intensity presence lights. However, it was also found that the fixity of bearing criterion has a number of shortcomings: it is invalid when either aircraft is changing course or speed and it may require a long pick-up range and lengthy periods of unwavering observation of the relative position of the intruder aircraft. An experiment is described which shows that observers with normal color vision are able to determine aircraft aspect and relative heading from the navigation light code with a moderately high degree of reliability. The reliability of judgement is decreased by higher intensity presence lights especially when they are located close to the navigation lights.

N79-32191/5 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Scientific Services.
Comparison of Some Methods to Determine the Delays of Landing Aircraft with Respect to Runway Capacity.
M. Vandenwilt. 3 Mar 79, 34p NLR-MP-77028-U

The capacity of runways in use for landing aircraft can become the chief bottleneck as regards the capacity of airports. This runway capacity can result in long queues of aircraft waiting to land, which in turn results in unacceptable delays. Two analytic methods for determining these delays are described and the results are compared. The two methods differ in their modeling of the queueing system, which results in an optimistic and a pessimistic estimate of the delays. Finally, a model for Monte Carlo simulations is briefly described. The uncertainties in results obtained from this simulaton model are estimated.

N79-32192/3 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
Wind Shear During Approach: An Investigation into the Influence of a Tower Measured Wind Environment on the Symmetric Motions of a Simulated Aircraft During an Automatic Approach.
J. Schurring. 10 Apr 79, 40p NLR-TR-77078-U
Contracts RB-RLD-76008, RB-RLD-77007

Measured wind profiles from the Royal Netherlands Meteorological Institute 200 m meteorological tower at Cabauw were used to estimate wind shear effects on the symmetric motions of an approaching aircraft. Wind profiles as well as an automatically approaching DC-9 aircraft were simulated on an electronic analog computer. The study shows that requirements for autopilots, etc., specifying only mean shear values, like the 8 km/100 ft concept (FAA), are not adequate. Simulation results and measured wind data for the year 1973 were combined to obtain statistical information on the chance of exceeding a certain deviation from the glide path during an approach. The results indicate that relatively large deviations in the aircraft flight path are related to nightly stable meteorological conditions, with low wind speeds at height of 10 m, in particular from the east or south. The largest deviations produced by the Cabauw wind profiles for 1973 did not exceed the coverage of a normal I.L.S. glide path indicator. Severe storms did not present hazardous situations in terms of vertical wind shear.

N79-33189/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Effect of Image Tilt of a Virtual Image Display on Simulated Transport Touchdown Performance.
R. V. Parrish, W. M. Kahlraum, Jr., and G. G. Steinmetz. Oct 79, 17p NASA-TP-1520, L-13087

An evaluation of the visual effect of image tilt of a refractive lens display system is presented. The system was used to present a rudimentary computer generated out the window scene to the pilot of a flight simulator during approach, flare, and touchdown. Comparisons are made of sink rate at touchdown and performances for untilted and tilted displays. Sixty four landings with each condition for a total of 128 touchdowns were made by 3 subjects. Performance measures, such as the flare and touchdown footprints, were recorded and analyzed. The visual effect of the image tilt was investigated for a terrain model board scene.

N79-33218/5 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Fixed-Base Simulation Study of Decoupled Longitudinal Controls During Approach and Landing of a Medium Jet Transport in the Presence of Wind Shear.
G. K. Miller, Jr.. Oct 79, 69p NASA-TP-1519, L-12842

The use of decoupled longitudinal controls during the approach and landing of a typical twin-engine jet transport in the presence of wind shear was studied. The simulation included use of a localizer and flight director to capture and maintain a 3 deg glide slope. The pilot then completed the landing by using visual cues provided below an altitude of 200 m by closed-circuit television and a terrain model. The decoupled controls used constant prefilter and feedback gains to provide steady state decoupling of flight path angle, pitch angle, and forward velocity. The use of the decoupled control system improved pilot performance during the approach and at touchdown in the presence of wind shears. The pilots preferred the decoupled controls and rated the task 1 to 3 increments better on a pilot rating scale, depending on wind conditions, than was the case when conventional controls were used.

1C. Aircraft

AD-A075 163/6 PC **A10**/MF **A01**
Bell Helicopter Textron Fort Worth TX
Investigation of the Crash-Impact Characteristics of Advanced Airframe Structures.
Final rept.,
James D. Cronkhite, Thomas J. Haas, Victor L. Berry, and Robert Winter. Sep 79, 222p USARTL-TR-79-11
Contract DAAJ02-77-C-0062
Prepared in cooperation with Grumman Aerospace Corp., Bethpage, NY.

The purpose of this program was to investigate the crash-impact characteristics of advanced troop transport helicopter airframe structures constructed of composite materials. Currently available information was surveyed on the crash-impact behavior of composite materials, analytical tools for design of crashworthy airframe structures, and air-

frame structure crashworthiness design criteria. Information on the crash-impact behavior of composite materials was found to be limited. Automotive studies showed that by innovative design, composite materials could function efficiently as energy absorbers to reduce crash-impact loads. Other pertinent studies were found that are currently in progress at Bell Helicopter Textron, the NASA Langley Research Center and the U.S. Army's Research and Technology Laboratories and are summarized. Finally, effects of composite materials on the compliance of airframe structures with current Army crashworthiness requirements are discussed.

AD-A075 186/7 PC **A02/MF A01**
Foreign Technology Div Wright-Patterson AFB OH
Device for Testing Parachutes in a Wind Tunnel,
I. M. Nosarev. 11 Dec 78, 11p Rept no. FTD-ID(RS)T-2094-78
Edited trans. of Patent (USSR) 171 142 p1-2 1965, by Carol S. Nack.

No abstract available.

AD-A075 192/5 PC **A02/MF A01**
Foreign Technology Div Wright-Patterson AFB OH
Aeronautical Knowledge (Selected Articles).
8 Feb 79, 12p Rept no. FTD-ID(RS)T-2346-78
Edited trans. of Hang K'ung Chih Shih (China) n6 p6, 26 1978.

No abstract available.

AD-A075 226/1 PC **A18/MF A01**
Center for Naval Analyses Alexandria VA Operations Evaluation Group
The Accelerometer Methods of Obtaining Aircraft Performance from Flight Test Data (Dynamic Performance Testing).
Professional paper,
William R. Simpson. Jun 79, 403p Rept no. CNA-PP-245

There are, in general, two basic methods of obtaining aircraft performance from flight test data. The first of these methods, the Direct method, is to fly a particular maneuver of interest and mathematically correct this maneuver to a given set of standard conditions. Several similar maneuvers at different flight conditions are then combined in a composite map representing one aspect of the aircraft performance. The Indirect method is more subtle and has its basis deeper in theory. By this method, a group of aerodynamic and propulsion parameters are developed which in themselves are only numbers and do not represent performance. These parameters are not tied to a specific maneuver or maneuver type, but in general relate the physical forces required to achieve a certain flight condition. Such parameters for an aircraft would be the drag coefficient, lift coefficient, thrust available, fuel flow requirements, etc. However, these parameters can be combined with known facts about the airframe and propulsion system in such a fashion as to compute airplane performance. With the advent of highly accurate accelerometers, the dynamic maneuvers have become attractive for development of aerodynamic data when obtaining aircraft performance using the Indirect Method.

AD-A075 259/2 PC **A02/MF A01**
George Washington Univ Washington D C School of Engineering and Applied Science
Research on Helicopter Rotor Noise.
Final rept. 1 Jun 76-30 Sep 79,
H. Liebowitz , and F. Farassat. Oct 79, 13p ARO-13517.3-EX
Grants DAAG29-78-G-0152, DAAG29-78-G-0259
Sponsored in part by Grant DAAG29-77-G-0174.

This report summarizes the results of studies in the following areas: (1) applications of generalized functions to aeroacoustics and aerodynamic problems, (2) bounds on thickness and loading noise of rotating blades and the effects of blade sweep on reduction of the noise of rotating blades, (3) study of nonlinear effects relevant to the rotor noise problem and (4) computational aspects of high speed rotor noise. (Author)

AD-A075 348/3 MF **A01**
Braslau (David) Associates Inc Minneapolis MN
Ground Run-Up Noise Control Facilities for Civil Aircraft - A Survey.
David Braslau. 30 Jan 79, 123p FAA-RD-79-17
Contract W1-78-5339-1
Availability: Microfiche copies only.

This survey of existing ground run-up suppressors and barriers for civil aircraft includes a review of acoustical, aerodynamical, and mechanical effects associated with facilities in the United States, Europe, and Japan. Evaluations were made of each suppressor based upon published and unpublished reports; and supplemented where necessary by direct questionnaires to the operators, designers, and users of the facilities. Acoustical data where available have been compiled for near and far field points at all directions from aircraft heading. Aerodynamic and mechanical effects on airframe and engine performance during run-up have been identified in terms of exhaust gas reingestion, engine or airframe damage, or restrictions on facility operation. The potential for standards development is discussed with respect to available information with recommendations for additional studies needed before such standards could be promulgated. Summary tables are included in the text for ease in comparison of data type and availability. Data sheets for each facility are included in an appendix. (Author)

AD-A075 378/0 PC **A11/MF A01**
United Technologies Research Center East Hartford CT
Investigation of the Airflow at Rocket Trajectory and Wind Sensor Locations of a Model Helicopter Simulating Low Speed Flight. Application of Model Helicopter Testing, Laser Velocimetry, and Rotor Wake Flow Visualization to Investigate the Aerodynamic Interference at Rocket Trajectories and Wind Sensors of a Helicopter Operating in Low Speed Flight.
Final rept. May 77-Sep 79,
Robert B. Taylor, and Anton J. Landgrebe. Sep 79, 233p UTRC-R79-912985-5, ARO-14277.1-E
Contract DAAG29-77-C-0013

An experimental investigation was conducted to determine the airflow characteristics in the vicinity of a model helicopter to determine the aerodynamic interference at representative rocket trajectories and wind sensor locations of an Army AH-1G helicopter operating in low speed forward flight. Laser velocimetry and flow visualization techniques were applied in a wind tunnel to provide flow velocity and wake geometry data for use in a rocket aeroballistics analysis, correlation with theory, and for a systematic determination of the influence of the helicopter components (rotor, fuselage, and wing) and significant operating condition parameters (flight speed, flight direction, ground effect, gross weight, and aircraft/rocket attitude) on the airflow influencing rocket trajectories. In addition, the flow velocities at potential locations for a fire control wind sensor mounted on the helicopter were determined to evaluate potential wind sensor locations for accurately measuring flow velocities at the low flight speeds required in accordance with current terrain flying/rocket firing tactics.

AD-A075 385/5 PC **A02/MF A01**
New Mexico State Univ Las Cruces Physical Science Lab
Balloon Systems and Launch Support.
Final rept. 1 Oct 76-31 Jan 79,
Stewart P. Bean , and John R. Ground. 15 Apr 79, 17p AFGL-TR-79-0175
Contract F19628-77-C-0031

The work performed under this contract consisted of; conducting balloon flight operations from selected sites; integrating GFE instrumentation and flight safety equipment into balloon borne payloads; providing engineering support for payload integration and integrity; fabricating, calibrating and repairing command control/telemetry equipment; analyzing data; and reporting flight results. (Author)

AD-A075 437/4 PC **A04/MF A01**
Army Command and General Staff Coll Fort Leavenworth KS
The A-10 and Design-to-Cost: How Well Did It Work.
Research study,
Roger E. Carleton. May 79, 51p

This document covers systems procurement in a design-to-cost atmosphere. Identifies deficiencies in this program and offers recommendations to improve this lack of responsiveness. (Author)

AD-A075 444/0 PC **A07/MF A01**
Naval Postgraduate School Monterey Ca
An Analysis of the Cost Effectiveness of a Specialized Mission Helicopter in the U.S. Coast Guard.
Master's thesis,
N. Edward King. Jun 79, 135p

The operations which might be performed by specialized mission helicopters are identified and several hypothetical mixes of these helicopters are developed and analyzed. Actual flight hours performed in fiscal years 1974 through 1978 are used as a data base for the study. The alternatives are analyzed in terms of total differential costs of performing the same missions that were conducted during the base period. Aspects such as the adding of additional helicopters to stations without additional personnel, dual qualification of personnel, shipboard operations of single-engine helicopters, and the short-range recovery replacement helicopter are also analyzed. It is concluded that it would have been cost effective to have operated specialized mission helicopters during the base period. Projections of future helicopter activity indicate that this advantage would continue into the future. (Author)

AD-A075 500/9 PC **A12/MF A01**
Rockwell International El Segundo CA North American Aircraft Div
Aircraft Transparency Failure and Logistical Cost Analysis - Supplemental Study.
Final rept. Feb-Jun 79,
S. S. Brown. Jun 79, 252p NA-79-237, AFFDL-TR-79-3083
Contract F33615-77-C-3060

Concern for increasing costs in maintenance of transparency systems has prompted the Air Force Flight Dynamics Laboratory to sponsor this study contract. The object of this study is to identify the higi-cost, high maintenance transparency components; identify ccause of failures; and recommend corrective programs to reduce cost of ownership to the Air Force Logistics Command. The study involved the review of 20 selected aircraft in current inventory to establish an extensive data base relating transparency maintenance activity and associated logistical support costs. An important adjunct to this study was to research design characteristics, perform a failure analysis, and identify associated logistical support cost for each study aircraft. By using a selective process of correlating the transparency failure modes and maintenance costs with the relative stature of aircraft in current inventory, corrective programs were established and verified by life-cycle cost trades. These corrective programs entailed a comprehensive search for various design improvement that could be innovated to negate the reported failures. The study results contained herein are an extension of objectives of the original program and are directed at supplementing the corrective programs for six additional aircraft. (Author)

AD-A075 513/2 PC **A15/MF A01**
Federal Aviation Administration Washington DC Office of Management Systems
Census of U.S. Civil Aircraft Calendar Year 1978.
Annual rept.,
Charles Moles, and Violet Wimbush. 31 Dec 78, 350p

The Census of U.S. Civil Aircraft contains an annual count of all registered civil aircraft in the United States. This information is disseminated by the Federal Aviation Administration to serve as an up-to-date reference on the U.S. civil aircraft fleet, its size and composition. Historical series are presented to enable industry and other aviation groups to evaluate aviation progress, to determine past trends, and to estimate future trends. This publication contains data for calendar year 1978.

AD-A075 566/0 MF **A01**
Boeing Vertol Co Philadelphia PA

CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume I,
R. Aiello, and J. Bendo. 7 Jul 78, 149p Rept no. D210-11168-3-VOL-1
Contract N00019-75-C-0396
See also Volume 2, AD-A075 570.
Availability: Microfiche copies only.

This document (13 volumes) presents plotted and tabulated flight data for all stress parameters measured during the CH-46 composite rotor blade flight stress survey and structural demonstration. This volume contains a description of test conditions, a summary of flight logs, calibrated blade section moduli and a complete description of instrumentation. The components under test were the A02R1702 composite rotor blades and the A02R1710 blade socket. Volumes 1 through 12 of this report contain the test results for the flight stress survey. Volume 13 contains the results of the structural demonstration.

AD-A075 570/2 PC **A14/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume II. Plotted Forward Rotor Blade Angles and Flap Loads,
R. Aiello, and J. Bendo. 1978, 319p Rept no. D210-11168-3-VOL-2
Contract N00019-75-C-0396
See also Volume 3, AD-A075 612.

This volume contains measured steady and alternating forward rotor blade angles and flap loads plotted versus true airspeed. The same data is tabulated in Volume 9.

AD-A075 612/2 PC **A14/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume III. Plotted Forward Rotor Blade Chord, Torsion and Absolute Loads,
R. Aiello, and J. Bendo. 1978, 324p Rept no. D210-11168-3-VOL-3
Contract N00019-75-C-0396
See also Volume 4, AD-A075 613.

This volume contains measured steady and alternating forward rotor blade chord, torsion and absolute loads plotted versus true airspeed. The same data is tabulated in Volume 9.

AD-A075 613/0 PC **A15/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume IV. Plotted Aft Rotor Blade Angles, and Flap Loads,
R. Aiello, and J. Bendo. 1978, 333p Rept no. D210-11168-3-VOL-4
Contract N00019-75-C-0396
See also Volume 5, AD-A075 614.

This volume contains measured steady and alternating aft rotor blade angles and flap loads plotted versus true airspeed. The same data is tabulated in Volume 10.

AD-A075 614/8 PC **A15/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume V. Plotted Aft Rotor Blade Chord Torsion and Absolute Loads,
R. Aiello, and J. Bendo. 1978, 326p Rept no. D210-11168-3-VOL-5
Contract N00019-75-C-0396
See also Volume 6, AD-A075 615.

This volume contains measured steady and alternating aft rotor blade chord, torsion and absolute loads plotted versus true airspeed. The same data is tabulated in Volume 10.

AD-A075 615/5 PC **A16/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume VI. Plotted Forward Rotor Rotating and Stationary Controls,
R. Aiello, and J. Bendo. 1978, 356p Rept no. D210-11168-3-VOL-6
Contract N00019-75-C-0396
See also Volume 7, AD-A075 616.

This volume contains measured steady and alternating forward rotor rotating and stationary controls loads plotted versus true airspeed. The same data is tabulated in Volume 11.

AD-A075 616/3 PC **A16/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume VII. Plotted Aft Rotor Rotating and Stationary Controls,
R. Aiello, and J. Bendo. 1978, 367p Rept no. D210-11168-3-VOL-7
Contract N00019-75-C-0396
See also Volume 8, AD-A075 617.

This volume contains measured steady and alternating aft rotor rotating and stationary controls loads plotted versus true airspeed. The same data is tabulated in Volume 11.

AD-A075 617/1 PC **A16/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume VIII. Plotted Forward and Aft Rotor Shaft Loads,
R. Aiello, and J. Bendo. 1978, 373p Rept no. D210-11168-3-VOL-8
Contract N00019-75-C-0396
See also Volume 9, AD-A075 618.

This volume contains measured steady and alternating forward and aft rotor shaft loads plotted versus true airspeed. The same data is tabulated in Volume 12.

AD-A075 618/9 PC **A13/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume IX. Tabulated Forward Rotor Blade Angles and Loads,
R. Aiello, and J. Bendo. 1978, 284p Rept no. D210-11168-3-VOL-9
Contract N00019-75-C-0396
See also Volume 10, AD-A075 619.

This volume contains measured steady and alternating forward rotor blade angles and loads tabulated by flight and event number. In addition, the associated maximum and minimum forward flap angles are also included. The steady and alternating data is plotted versus true airspeed and can be found in Volumes 2 and 3.

AD-A075 619/7 PC **A13/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume X. Tabulated Aft Rotor Blade Angles and Loads,
R. Aiello, and J. Bendo. 1978, 292p Rept no. D210-11168-3-VOL-10
Contract N00019-75-C-0396
See also Volume 11, AD-A075 620.

This volume contains measured steady and alternating aft rotor blade angles and loads tabulated by flight and event number. In addition, the associated maximum and minimum aft flap angles are also included. The steady and alternating data is plotted versus true airspeed and can be found in Volumes 4 and 5.

AD-A075 620/5 PC **A13/MF A01**
Boeing Vertol Co Philadelphia PA
CH-46 Composite Rotor Blade Flight Stress Survey Data. Volume XI. Tabulated Forward and Aft Rotor Control Loads,
R. Aiello, and J. Bendo. 1978, 291p Rept no. D210-11168-3-VOL-11
Contract N00019-75-C-0396
See also Volume 12, AD-A075 621.

This volume contains measured steady and alternating forward and aft controls loads tabulated by flight and event number. This same data is shown plotted versus true airspeed and can be found in Volumes 6 and 7.

AD-A075 621/3 PC **A12/MF A01**
Boeing Vertol Co Philadelphia PA
Ch-46 Composite Rotor Blade Flight Stress Survey Data. Volume XII. Tabulated Forward and Aft Rotor Shaft Loads, Load Factor, Pitch and Roll Attitude and Rotor RPM,
R. Aiello, and J. Bendo. 1978, 251p Rept no. D210-11168-3-VOL-12
Contract N00019-75-C-0396
See also Volume 1, AD-A075 566.

This volume contains measured steady and alternating forward and aft rotor shaft loads tabulated by flight and event number. Maximum and minimum forward and aft shaft torque values are included in this grouping. The steady and alternating data is plotted versus true airspeed and can be found in Volume 8. In addition, this volume contains measured (steady, maximum and minimum) load factor, pitch/roll attitude, and rotor rpm tabulated by flight and event number.

N79-32164/2 PC **A06/MF A01**
Boeing Commercial Airplane Co., Seattle, Wash.
Modal Interpolation Program, L215 (INTERP). Volume 1: Engineering and Usage.
Topical Report, May 1975 - May 1977.
R. I. Kroll, and M. Y. Hirayama. Oct 79, 121p NASA-CR-2847, D6-44456-V-1
Contract NAS1-13918

The usage of the Modal Interpolation Program L215 (INTERP) is described. The program uses modal data to form sets of arrays containing interpolation coefficients. The interpolation arrays can then be used to determine displacements at various aerodynamic surface and surface slopes that are parallel and perpendicular to the freestream direction. Five different interpolation methods are available. A description of the data manipulation and the interpolation methods is presented.

N79-32181/6 PC **A02/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Scientific Services.
Multi-Element Airfoil Design by Optimization.
T. E. Labrujere. 19 Jun 78, 10p NLR-TR-78135-U
Conf-Presented at 11th ICAS Congr., Lisbon, Sep. 1978.

A method is presented for the design of multi-element airfoils in incompressible flow such that a priori specified aerodynamic and geometric requirements are fulfilled approximately. An object function is formed by summing the squared weighted deviations from the prescribed pressure distribution, zero normal velocity, and geometric conditions. Minimizing the object function results in the simultaneous determination for the shape of the airfoil and the real pressure distribution.

N79-32197/2 PC **A11/MF A01**
Rockwell International Corp., Los Angeles, Calif.
HIMAT Structural Development Design Methodology.
M. A. Price. Oct 79, 234p NASA-CR-144886
Contract NAS4-25600

In order to improve aerodynamic performance, a twist criterion was used to design the canard and wing lifting surfaces of two graphite-epoxy research aircraft. To meet that twist criterion, the lifting surfaces were tailored using graphite-epoxy tape. The outer surface of the aircraft is essentially constructed of 95 percent graphite epoxy materials. The analytical tools and methodology used to design those lifting surfaces are described. One aircraft was subjected to an 8g ground test in order to verify structural integrity and to determine how well the desired twist was achieved. Test results are presented and the reductions of both flight and ground strain test gages and their associated stresses are discussed. The research aircraft is a remotely piloted vehicle.

N79-32204/6 PC **A02/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
Qualification Tests for Helicopters to Be Used on Board Ships.
T. Hoekstra, R. Fang, C. Leijnse, and L. T. Reinirie. 17 Aug 78, 21p NLR-MP-78032-U
Conf-Presented at Europort Naval Conf., Amsterdam, 14-17 Nov. 1978.

Although helicopter manufacturers usually define limits for the safe operation of a helicopter, they generally apply to a rigid platform situation only. For operations involving ships, additional limitations must be observed. The requirement for the development of adapted operation procedures for helicopters and the determination of new limitations to ensure optimum use and adequate safety are discussed. The relevant test procedure is de-

scribed. It is shown that, despite certain difficulties related to the kinds of tests, the desired objective can be attained.

N79-32214/5 PC **A02/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
Handling Problems Resulting from Compressor Deterioration.
J. P. K. Vleghert. 6 Jun 78, 11p NLR-MP-78019-U
Conf-Presented at AGARD Propulsion and Energetics Panel Symp. On Stresses, Vibration Structural Integration and Engine Integrity, Cleveland, 23-27 Oct. 1978.

The Royal Netherlands Air Force has experienced performance loss and increased rate of inflight compressor stalls due to compressor deterioration on some of their 15 year old engines. Investigations on the Maintenance Depot test bed showed that significant loss of air mass flow occurred near the surge line under conditions which were not covered by the normal post-overhaul acceptance tests. It was also found that impending stall was always produced by increasing pressure fluctuations, although the level of these pressure fluctuations varied with different engines. A method was developed to routine check for this phenomenon. The surge margin of the affected engines was recovered by replacing the rear compressor casing. Further investigation, conducted by the engine manufacturer to narrow down the reason for the engine's behavior, is discussed.

N79-32216/0 PC **A05/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Aircraft Design Loads Due to Non-Stationary Atmospheric Turbulence Patches.
R. Noback. 27 Jun 78, 90p NLR-TR-78073-U
Contract NIVR-1775

It is assumed that atmospheric turbulence appears in patches and that within the patches the turbulence can be described as a modulated Gaussian process. The patch lengths are shown to have a certain probability density function. Load exceedance curves and design loads for various aircraft models using this turbulence model are compared with those obtained with the power spectral density (PSD) turbulence model. Results show that the PSD model is more powerful than the underlying assumptions suggest and that it should continue to be used for the establishment of design loads, as its application is less complicated, even though the modulated Gaussian turbulence patch model gives a better description of atmospheric turbulence.

N79-32265/7 PC **A03/MF A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
Release-Rate Calorimetry of Multilayered Materials for Aircraft Seats.
L. L. Fewell, F. Duskin, H. Spieth, E. Trabold, and J. A. Parker. Aug 79, 26p NASA-TM-78594, A-7856

Multilayered samples of contemporary and improved fire resistant aircraft seat materials (foam cushion, decorative fabric, slip sheet, fire blocking layer, and cushion reinforcement layer) were evaluated for their rates of heat release and smoke generation. Top layers (decorative fabric, slip sheet, fire blocking, and cushion reinforcement) with glass fiber block cushion were evaluated to determine which materials based on their minimum contributions to the total heat release of the multilayered assembly may be added or deleted. Top layers exhibiting desirable burning profiles were combined with foam cushion materials. The smoke and heat release rates of multilayered seat materials were then measured at heat fluxes of 1.5 and 3.5 W/cm 2. Choices of contact and silicone adhesives for bonding multilayered assemblies were based on flammability, burn and smoke generation, animal toxicity tests, and thermal gravimetric analysis. Abrasion tests were conducted on the decorative fabric covering and slip sheet to ascertain service life and compatibility of layers.

N79-32283/0 PC **A02/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Environmental Fatigue Crack Propagation in Metal/Composite Laminates.
R. J. H. Wanhill. Jun 78, 24p NLR-MP-78027-U
Subm-Submitted for Publication.

Flight simulation fatigue crack propagation tests with gust spectrum loading were carried out on 2024-T3/carbon-epoxy, 7475-T761/carbon-epoxy, and Ti-6A1-4V/carbon-epoxy laminates with nominal weight savings of 30% as compared to equivalent 2024-T3 panels. The performance of the 2024-T3/carbon-epoxy laminates was much superior to those of the other material combinations. Overall, there was a fairly strong effect caused by changing from an environment of normal air to an air plus water spray environment. Probable reasons for this strong effect are discussed.

N79-32344/0 PC **A03/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Aluminum Alloys for Advanced Structural Applications in Transport Aircraft.
R. J. H. Wanhill. Feb 79, 33p NLR-MP-77023-U
Subm-Submitted for Publication.

Three topics of interest for aluminum alloy aircraft structural materials are discussed. These are the advent of metallurgically cleaner alloys like 2124, 2048 and 7475, possessing higher fracture toughness than older materials, e.g. 2024 and 7075, the potential application of 7000 series alloys (notably 7475) in tension panels, rather than the customary 2000 series alloys, and the development of alloys like 7049, 7050 and 7010, combining high strength through thick sections with high fracture toughness and good resistance to stress corrosion and exfoliation. Two developments which may reach commercial production status in the future are also considered. These are powder metallurgy alloys for extrusions and forgings with improved stress corrosion resistance, fracture toughness, and fatigue strengths as compared to conventional materials, and thermomechanical treatment to achieve combinations of properties unobtainable from conventional processing.

N79-32345/7 PC **A02/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
The Effect of Sheet Thickness on Flight Simulation Fatigue Crack Propagation in 2024-T3, 7475-T761, and Mill Annealed Ti-6Al-4V.
R. J. H. Wanhill. Feb 79, 22p NLR-MP-77024-U
Subm-Sponsored in Part by Netherlands Agency for Aerospace Programmes (NIVR).

Flight simulation fatigue crack propagation tests were carried out on 2024-T3, 7475-T761, and mill annealed Ti-6Al-4V sheet in thicknesses up to 3 mm. The specimens are representative of transport aircraft lower wing skin stiffened panels with end load capacities of 1.5 and 3 MN/m. Results prove that sheet thickness has a significant effect on crack propagation. Thinner gage materials exhibited slower crack propagation mainly because of greater retardation of crack growth after severe flights. The relevance of the results for the choice of advanced structural concepts and materials is discussed and a recommendation for further investigation is given.

N79-32596/5 PC **A02/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Engineering Application of Fracture Mechanics to Flight Simulation.
R. J. H. Wanhill. May 78, 12p NLR-MP-78015-U
Conf-Presented at Intern. Conf. On Fracture Mech. In Eng. Appl., Bangalore, India, Mar. 1979.

Experimental data on the fracture mechanics of flight simulation crack propagation were studied and a characteristic, K, was derived. The phenomena considered were design stress level, gust severity, spectrum truncation, and crack growth from one of both sides of a hole. Results show that for a change in design stress level up to 25% the data is correlated fairly well by K, except when crack growth rate correlations due to severe flights were not transient with respect to the overall trend of growth rates. Gust severity effects are correlated by Ka sub rms, the stress intensity pertaining to the root mean square of the gust amplitudes. However, gust alleviation and spectrum truncation effects are not correlatable by a K value descriptive of changes in the load excursion magnitudes. Crack growth rates at each tip of a crack at one or both sides of a circular hole are correlated by a characteristic K.

N79-32597/3 PC **A03/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Gust Spectrum Fatigue Crack Propagation in Candidate Skin Materials.
R. J. H. Wanhill. May 78, 32p NLR-MP-78022-U
Subm-Submitted for Publication.

Flight simulation fatigue crack propagation tests were carried out on 2024-T3, 7475-T761, and mill annealed Ti-6Al-4V sheet in thicknesses up to 3 mm. These materials are representative of those used in transport aircraft lower wing skin stiffened panels with end load capacities of 1.5 and 3 MN/m. The performance of 2024-T3 was much superior to the others, owing mainly to greater retardation of crack growth after severe flights. The effect of load truncation was also greater for 2024-T3. The significance of the results of the choice of advanced structural concepts and materials, and the choice of truncation level is discussed. A recommendation for further investigation is given.

N79-33171/6 PC **A04/MF A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Procedures for Estimating the Frequency of Commercial Airline Flights Encountering High Cabin Ozone Levels.
J. D. Holdeman. Oct 79, 56p NASA-TP-1560, E-9991

Three analytical problems in estimating the frequency at which commercial airline flights will encounter high cabin ozone levels are formulated and solved: namely, estimating flight-segment mean levels, estimating maximum-per-flight levels, and estimating the maximum average level over a specified flight interval. For each problem, solution procedures are given for different levels of input information - from complete cabin ozone data, which provides a direct solution, to limited ozone information, such as ambient ozone means and standard deviations, with which several assumptions are necessary to obtain the required estimates. Each procedure is illustrated by an example case calculation that uses simultaneous cabin and ambient ozone data obtained by the NASA Global Atmospheric Sampling Program. Critical assumptions are discussed and evaluated, and the several solutions for each problem are compared. Example calculations are also performed to illustrate how variations in lattitude, altitude, season, retention ratio, flight duration, and cabin ozone limits affect the estimated probabilities.

N79-33172/4 PC **A04/MF A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Comparative Analysis of PA-31-350 Chieftain (N44Iv) Accident and NASA Crash Test Data.
R. J. Hayduk. Oct 79, 59p NASA-TM-80102, L-13064

A full scale, controlled crash test to simulate the crash of a Piper PA-31-350 Chieftain airplane is described. Comparisons were performed between the simulated crash and the actual crash in order to assess seat and floor behavior, and to estimate the acceleration levels experienced in the craft at the time of impact. Photographs, acceleration histories, and the tested airplane crash data is used to augment the accident information to better define the crash conditions. Measured impact parameters are presented along with flight path velocity and angle in relation to the impact surface.

N79-33191/4 PC **A15/MF A01**
National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.
Processing of on-Board Recorded Data for Quick Analysis of Aircraft Performance.
N. H. Michaud. Sep 79, 326p NASA-RP-1043

A system of independent computer programs for the processing of digitized pulse code modulated (PCM) and frequency modulated (FM) data is de-

scribed. Information is stored in a set of random files and accessed to produce both statistical and graphical output. The software system is designed primarily to present these reports within a twenty-four hour period for quick analysis of the helicopter's performance.

N79-33207/8 PC **A04**/MF **A01**
Lockheed-California Co., Burbank.
Study of the Application of Hydrogen Fuel to Long-Range Subsonic Transport Aircraft. Volume 1: Summary.
Final Report.
G. D. Brewer, R. E. Morris, R. H. Lange, and J. W. Moore. Jan 75, 56p NASA-CR-132558, LR-26752-1
Contract NAS1-12972
Misc-for Vol. 2 See N75-30163.

The feasibility of using liquid hydrogen as fuel in advanced designs of long range, subsonic transport aircraft is assessed. Both passenger and cargo type aircraft are investigated. Comparisons of physical, performance, and economic parameters of the LH2 fueled designs with conventionally fueled aircraft are presented. Design studies are conducted to determine appropriate characteristics for the hydrogen related systems required on board the aircraft. These studies included consideration of material, structural, and thermodynamic requirements of the cryogenic fuel tanks and fuel systems with the structural support and thermal protection systems.

N79-33209/4 PC **A03**/MF **A01**
AiResearch Mfg. Co., Torrance, Calif.
Thermal-Structured Design Study of an Airframe-Integrated Scramjet.
Final Report, Jun. 1975 - Dec. 1978.
O. A. Buchmann. Oct 79, 38p NASA-CR-3141, AIRESEARCH-78-15442-1
Contract NAS1-13984

Design concepts for the cooled structures assembly for the Langley Scramjet engine, for engine subsystems, and for the aircraft/engine interface were developed and evaluated. Results show that the objectives for the Scramjet engine can be met. A thermal protection system was defined that makes it possible to attain a life of 100 hours and 1000 cycles, which is the specified goal. With stoichiometric combustion, the fuel provides an adequate heat sink for cooling the engine at Mach numbers up to 9 at the minimum fuel flow condition. The mechanical design is feasible for manufacture using conventional materials. For the cooled structures in a six-module engine, the mass per unit capture area is 1328 kg/sq m (259 lb/sq ft). The total mass of a six-module engine assembly including the fuel system is 1577 kg (3477 lb).

N79-33216/9 PC **A04**/MF **A01**
Naval Academy, Annapolis, Md.
Wind Tunnel Investigation of the Free-Wing/Free Trimmer Concept.
Status Report, Jan. - Oct. 1979.
D. R. Sandlin. Oct 79, 59p NASA-CR-162351
Grant NSG-4020

The conclusions arrived at in this investigation are: (1) the free-wing/free-trimmer configuration is a viable concept, and exhibited both static and dynamic stability for a trimmer pivot at the 10 percent chord position; (2) unless properly controlled, friction in the mounting system and instrumentation can significantly affect the panel response; and (3) for the configurations tested, the control was far too sensitive, giving the full range of wing angle-of-attack for trimmer flap displacements of only a few degrees.

N79-33217/7 PC **A04**/MF **A01**
Lockheed-California Co., Burbank.
Accelerated Development and Flight Evaluation of Active Controls Concepts for Subsonic Transport Aircraft.
Oct 79, 62p NASA-CR-159148, LR-29111
Contract NAS1-14690

The flight test of an active load alleviation/extended span for the L-1011 wide-body transport aircraft, and piloted simulation work leading to use of active stability augmentation with a small tail and aft center of gravity are reported. The extended span showed the expected cruise drag reduction of 3%. The small tail is expected to reduce cruise drag by another 3%, and eventual use of more aft center of garvity with active stability augmentation will provide further fuel savings. The active load alleviation functions included maneuver load control (MLC) and elastic mode suppression (EMS), using symmetric motions of the outboard ailerons to reduce wing bending loads in maneuvers or long-term up- or down-drafts (MLC), and to damp wing bending motions in turbulence (EMS). A gust load alleviation function using the active horizontal tail to provide airplane pitch damping in turbulence was found unnecessary. The piloted simulation tests evaluated criteria for augmentation-on and augmentation-off flying qualities. of a simple pitch control law was verified at neutral static margin. The simulation tasks established the basis for follow-on construction and flight testing of a small tail with active stability augmentation.

N79-33477/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Nasa Gear Research and Its Probable Effect on Rotorcraft Transmission Design.
E. V. Zaretsky, D. P. Townsend, and J. J. Coy. 1979, 19p NASA-TM-79292, E-236
Conf-Presented at the Meeting on Helicopter Propulsion Systems, Williamsburg, VA., 6-8 Nov. 1979; Sponsored by AM. Helicopter Soc.

The results of the NASA gear research is reviewed as well as those programs which are presently being undertaken. Research programs studying pitting fatigue, gear steels and processing, life prediction methods, gear design and dynamics, elastohydrodynamic lubrication, lubrication methods and gear noise are presented. The impact of advanced gear research technology on rotorcraft transmission design is discussed.

N79-33499/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
Criteria for Representing Circular Arc and Sine Wave Spar Webs by Non-Curved Elements.
J. M. Jenkins. Oct 79, 15p NASA-TM-72869, H-1106

The basic problem of how to simply represent a curved web of a spar in a finite element structural model was addressed. The ratio of flat web to curved web axial deformations and longitudinal rotations were calculated using NASTRAN models. Multiplying factors were developed from these calculations for various web thicknesses. These multiplying factors can be applied directly to the area and moment of inertia inputs of the finite element model. This allows the thermal stress relieving configurations of sine wave and circular arc webs to be simply accounted for in finite element structural models.

N79-33855/4 PC **A08**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Computer-Automated Opponent for Manned Air-to-Air Combat Simulations.
W. W. Hankins, III. Sep 79, 153p NASA-TP-1518, L-12768

Two versions of a real-time digital-computer program that operates a fighter airplane interactively against a human pilot in simulated air combat were evaluated. They function by replacing one of two pilots in the Langley differential maneuvering simulator. Both versions make maneuvering decisions from identical information and logic; they differ essentially in the aerodynamic models that they control. One is very complete, but the other is much simpler, primarily characterizing the airplane's performance (lift, drag, and thrust). Both models competed extremely well against highly trained U.S. fighter pilots.

N79-33968/5 PC **A07**/MF **A01**
Lockheed-California Co., Burbank.
Anopp Validation Study: Lockheed L-1011.
L. Godby. 25 Oct 79, 139p NASA-CR-159138, LR-29177
Contract NAS1-15651

The aircraft noise prediction program (ANOPP) was used to predict the far-field noise characteristics of an L-1011 aircraft equipped with RB.211-524B engines. Actual flight noise was compared with noise predicted for the same operating and weather conditions. Correlation of predicted and measured results was very good in the aft quadrant of radiated noise. Predicted noise levels were significantly different from measured values in the forward quadrant because fan noise was predicted high. Since the major noise sources were fan and core, corrections are supplied to adjust ANOPP fan and core noise components so that the total predicted noise matches the measured L-1011 noise levels.

1D. Aircraft Flight Control and Instrumentation

AD-A075 120/6 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
Using Light Emitting Diodes (LED) in Aircraft Analog Indicators,
Jan Tomaszewicz. 6 Feb 79, 21p Rept no. FTD-ID(RS)T-0070-79
Edited trans. of Technika Lotnicza i Astronautyczna (Poland) v31 n11 p28-31 1977, by F. Zaleski.

No abstract available.

N79-32185/7 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
Cockpit Displays of Traffic Information: Airline Pilots Opinions About Content, Symbology, and Format.
S. G. Hart, and T. E. Wempe. Aug 79, 54p NASA-TM-78601, A-7884

A number of candidate computer-generated cockpit displays of traffic information (CDTI) displays and display options were simulated statically and were shown to 23 airline pilots who were asked to respond to more than 250 questions about them. The pilots indicated that the amount and complexity of navigation information displayed should increase with altitude and map scale. Terrain information should appear automatically if a pilot's own aircraft descends below the minimum safe altitude and should include only those obstruction within 2,000 ft or less. Few pilots that weather information should be displayed on a CDTI, but if it was, it should be at pilot request only. A chevron-shaped symbol, located so that the majority of the map area was ahead was preferred. The position, altitude, ground speed, ground track, weight class, and flightpath history of other aircraft should be presented graphically by coding the shape of the symbol for other aircraft or presented digitally in data tags displayed at pilot request. All pilots thought that color coding was necessary to recognize different categories of information quickly and accurately. The majority of pilots felt that a CDTI would provide useful information even though its presence might increase their workload somewhat particularly during its introductory stages.

N79-33201/1 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A Review of Some Head-Up Display Formats.
J. M. Naish. Oct 79, 51p NASA-TP-1499, A-7708

Two alternate head-up display devices (HUD) were compared for properties relevant to the accurate performance of concurrent tasks in real flight conditions and in various flight modes. The comparisons were made to find the disorientation resistance of the HUDs along with the tracking accuracy, interference resistance, fixation resistance, and error resistance. The use of displacement and flight path information for vertical control is discussed in terms of flight stability. Several combinations of symbols and driving signals are described, including a compensated control law, which were used in simulated flight to deal with wind shear.

1E. Air Facilities

AD-A075 485/3 PC **A05**/MF **A01**
Naval Air Engineering Center Lakehurst Nj

Optimum Intensity Settings of Approach and Runway Light Systems.
Final rept.,
Charles A. Douglas. 20 Aug 79, 86p FAA/RD-79-87
Contract DOT-FA77WAI-786
Prepared in cooperation with Quanta Systems Corp., Rockville, MD, contract N68335-78-C-2022.

Criteria for determining the optimum intensity settings of approach and runway lights, as a function of atmospheric transmissivity and/or meteorological visibility, have been developed. In determining the optimum intensity settings, consideration was given to past practices, theoretical and experimental studies, and to the effects of the intensity setting on runway visual range. Changes in the present intensity setting criteria are recommended. (Author)

AD-A075 537/1 PC **A09**/MF **A01**
Federal Aviation Administration Washington DC
Airport Pavement Design and Evaluation.
Advisory circular.
7 Dec 78, 190p Rept no. FAA/AC-150/5320-6C
Supersedes Rept. no. FAA/AC-150/5320-LB, dated 28 May 1974.

Airport pavements are constructed to provide adequate support for the loads imposed by aircraft using an airport and to produce a firm, stable, smooth, all-year, all-weather surface free from dust or other particles that may be blown or picked up by propeller wash or jet blast. In order to satisfactorily fulfill these requirements, the pavement must be of such quality and thickness that it will not fail under the load imposed. In addition, it must possess sufficient inherent stability to withstand, without damage, the abrasive action of traffic, adverse weather conditions, and other deteriorating influences. To produce such pavements requires a coordination of many factors of design, construction, and inspection to assure the best possible combination of available materials and a high standard of workmanship. These factors are discussed in this report.

2. AGRICULTURE

2B. Agricultural Economics

PB80-113053 PC **A07**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC.
Handbook of Agricultural Charts, 1979.
Oct 79, 148p AGRICULTURE/HB-561

The 1979 chartbook presents almost 300 charts with brief explanatory text. Short tables are often included to provide greater detail. Major subjects are: the farm, natural resources, population, and rural development, consumers, food and nutrition programs, foreign production and trade, and commodity programs. A final section tells how to order slides or photographic prints of charts in the book.

2C. Agricultural Engineering

PB80-113244 PC **A06**/MF **A01**
National 4-H Tractor Program's Extension Sub-Committee.
L'Entretien des Machines Agricoles (Farm Machinery Care).
1979, 124p
Text in French. Sponsored in part by Agency for International Development, Washington, DC.

The translation of an English publication titled 'Machinery Care Project D Units' covers the following: Knowledge of parts used in machinery; The importance of screws and bolts, nuts, wrenches, their size, the different size of nails, their different shapes; the main point being for each task, its tool; Gearboxes are described with photos; Diagrams of engines and all mechanical aspects of machinery are shown. Different farm machinery treated in the brochure are tractors, ploughs, harrows, sprays, cultivators, planters, mowers, choppers, harvesters, threshing machines, cotton gins, cotton pickers, and corn shellers. The different systems of coupling machinery are described. Maintenance for all machinery is also included.

PB80-113269 PC **A05**/MF **A01**
Soil Conservation Service, Washington, DC.
Comment Irriguer vos Terres (Land Irrigation).
1968, 97p
Text in French. Sponsored in part by Agency for International Development, Washington, DC. Prepared in cooperation with Bureau of Reclamation, Washington, DC.

This translation of an English publication titled 'Irrigation on Western Farms' covers the following: What is irrigation; how to irrigate lands; the humidity of the soil and its importance for the growth of plants; diagrams on the different methods used for irrigation; conveyance and control of irrigation water; how to build ditches, and to lay pipes; and the different kinds of canalization with photos and diagrams.

2D. Agronomy and Horticulture

PB80-113251 PC **A05**/MF **A01**
Agricultural Research Service, Washington, DC. Crops Research Div.
Le Sorgho a Grains: Culture et Utilisation (Culture and Utilization of Grain Sorghum),
W. M. Ross, and O. J. Webster. 1967, 82p
Text in French. Sponsored in part by Agency for International Development, Washington, DC.

The illustrated publication gives a detailed description of grain sorghum, climates where it is best grown, varieties and hybrids, rotation, fertilizers, planting time and methods, weed killing, irrigation, harvesting, storage, utilization, insects and diseases, and production, with special emphasis on the production of seed-grain and hybrids.

2F. Forestry

PB80-801764 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Development of Forest Industries (A Bibliography with Abstracts).
Rept. for 1964-Dec 79,
Robena J. Brown. Dec 79, 292p
Supersedes NTIS/PS-78/1276, NTIS/PS-77/1142, NTIS/PS-76/0959, and NTIS/PS-75/827.

The citations provide information on lumber and plywood production, as well as on methods of storage and handling of logs and wood products. Opportunities for employment, business investments, and economic promotion in underdeveloped areas are included. (This updated bibliography contains 283 abstracts, 21 of which are new entries to the previous edition.

3. ASTRONOMY AND ASTROPHYSICS

3A. Astronomy

AD-A075 175/0 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
On the Fundamental Possibility of Decreasing the Influence of the Atmosphere on the Image of a Star,
V. P. Linnik. 31 May 79, 10p Rept no. FTD-ID(RS)T-0714-79
Edited trans. of Optika i Spektroskopiya (USSR) Issue 4 v3 p401-402 Oct 57, by Bernard L. Tauber.

No abstract available.

3B. Astrophysics

AD-A075 038/0 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB Ma
Observatory Report: Sagamore Hill Radio Observatory,
Donald A. Guidice. 1979, 3p Rept no. AFGL-TR-79-0198
Pub. in Bulletin of the American Astronomical Society, VII Ni p311-312 1979.

No abstract available.

N79-33122/9 PC **A02**/MF **A01**
Science Applications, Inc., Tucson, Ariz.
Neptune: Limb Brightening within the 7300 Angstrom Methane Band.
M. J. Price, and O. G. Franz. 1979, 24p NASA-CR-162319
Contract NASW-3134

Narrow-waveband (100A) photoelectric slit scan photometry of the Neptune disk is reported. Observations were concentrated within the strong CH4 band at lambda 7300A. For comparison, measurements were also made within a continuum waveband at lambda 6800A. Point spread function data were obtained in both colors. Qualitative estimates of the true intensity distribution over the Neptune disk were made. Within the lambda 6800A continuum band, Neptune appears as an essentially uniform disk. Within the lambda 7300A CH4 band, the planet exhibits strong limb-brightening. The results appear to require the presence of an optically thin layer of brightly scattering aerosol particles high in the Neptune atmosphere.

N79-33138/5 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Models of p/Tempel 2.
R. L. Newburn, Jr. 1 Sep 79, 52p NASA-CR-162292, JPL-PUB-79-60
Contract NAS7-100

Quantitative models of Comet Tempel 2 at various heliocentric distances were created using a semi-empirical theory which ties gas production rates to the light curve. Physical properties of the nucleus and gas and dust densities are supplied for a nominal case and two extreme cases at each distance, the extreme cases being based upon a sum-of-negative-tolerances approach.

N79-33139/3 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Planetary Data System Requirements: Multi-Mission Radio Science Requirements for the 1978 to 1988 Era.
H. T. Howard. 1 Oct 79, 66p NASA-CR-162306, JPL-PUB-79-74
Contract NAS7-100

The functional and performance requirements for support of multimission radio science are established. The classes of radio science investigation are described and the needed data is discussed. This document is for a sliding ten year period and will be iterated as the mission set evolves.

N79-33141/9 PC **A02**/MF **A01**
Cornell Univ., Ithaca, N. Y. Center for Radiophysics and Space Research.
Lunar Studies.
Final Technical Report.
T. Gold. 1979, 41p NASA-CR-162318
Contract NGL-33-010-005

Experimental and theoretical research, concerning lunar surface processes and the nature, origin and derivation of the lunar surface cover, conducted during the period of February 1, 1971 through January 31, 1976 is presented. The principle research involved were: (1) electrostatic dust motion and transport process; (2) seismology properties of fine rock powders in lunar conditions; (3) surface processes that darken the lunar soil and affect the surface chemical properties of the soil grains; (4) laser simulation of micrometeorite impacts (estimation of the erosion rate caused by the micrometeorite flux); (5) the exposure history of the lunar regolith; and (6) destruction of amino acids by exposure to a simulation of the solar wind at the lunar surface. Research papers are presented which cover these general topics.

N79-33145/0 PC **A06**/MF **A01**
Ruhr Univ., Bochum (Germany, F.R.). Bereich Extraterrestrische Physik.
Heating of Spherical Interplanetary Particles Close to the Sun (Solar Probe Helios a and B: Experiment 10 Z).
Final Report.
M. Rohde. Dec 78, 105p BMFT-FB-W-78-33
Contracts BMFT-WRS-01081, DFVLR-01-BPT-QC-036A
In German; English Summary.

The temperature of interplanetary dust grains as a function of solar distance is discussed, adopting simplified assumptions for the energy distribution

in the solar spectrum. These temperatures determine strongly possible evaporation close to the sun. This is important for the interpretation of helios measurements, especially with respect to micrometeorites. After a thorough review and compilation of the theoretical background (Mie-formalism), the efficiency factors for absorption and radiation pressure were calculated taking into account the wavelength dependence of refractive indices of different materials. Using these data and the energy distribution of the solar spectrum, equilibrium temperatures were computed for particles up to 100 microns in size. Considerable differences between the materials (magnetite, obsidian, andesite, olivine) were found. Furthermore deviations of equilibrium temperatures from the blackbody approximation, especially in the size region 0.2 microns, suggest different particle concentrations near the sun for different types of particles depending on size and material.

N79-33148/4 PC **A09**/MF **A01**
Max-Planck-Institut fuer Physik und Astrophysik, Garching (Germany, F.R.). Inst. fuer Extraterrestrische Physik.
Untersuchung der Anomalen Komponente der Niederenergetischen Kosmischen Teilchenstrahlung: Experimentelle Ergebnisse und Ein Numerisches Modell (Investigation of the Anomalous Component of Low Energy Cosmic Rays: Experimental Results and a Numerical Model).
B. Klecker. Jul 78, 177p MPI-PAE/EXTRATERR-147
Language in German.

The origin of this anomalous component was studied from low energy cosmic ray data obtained during the quiet sun (November 1973 to September 1976). The N, O, and Ne fluxes (with energies in excess of 3 MeV/nucleon) that are not correlated with interplanetary activity and whose relative frequencies indicate them to be of neither galactic nor solar origin are observed. It is postulated that this component arises from neutral interstellar gas ionized and accelerated by magnetoacoustic waves. The calculated numerical model shows that a group of four simultaneous parameters are sufficient to reproduce the measured energy spectra, the relative frequencies recorded, and the radial gradients observed (heliosphere magnitude, magnitude and energy dependence of the acceleration coefficient, and the number of ions accelerated).

N79-33149/2 PC **A03**/MF **A01**
Lund Univ. (Sweden). Dept. of Physics.
The Cosmic Ray Boron and Carbon Isotopic Composition Measured in Nuclear Emulsions.
C. Bjarle, N. Y. Herrstroem, G. Joensson, and K. Kristiansson. 7 May 79, 30p LUIP-7906

The isotopic compositions of primary cosmic ray boron and carbon in the energy interval 135 to 390 MeV/N were studied using photometric measurements obtained from tasks found in an Ilford G5 emulsion stack exposed to the radiation. The boron measurement is the first that has been made with nuclear emulsions. The carbon measurement makes it possible to substantially improve the statistical accuracy in the determination of 13 C abundance as compared to earlier emulsion measurements. The mass determinations are based on measurements of the relation between track with and residual range with a high precision nuclear track photometer. The method of measurement is briefly described with special emphasis on the errors which arise in this kind of measurement. Preliminary isotopic ratios obtained in this investigation are reported.

N79-34017/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
A Procedure for Determining the Optical Characteristics of a Device for Measuring Illumination in the Atmosphere of Venus.
Y. M. Golovin, and B. Y. Moshkin. Oct 79, 22p NASA-TM-75712
Contract NASW-3198
Tran-Transl. Into English of Metodika Opredeleniya Opticheskikh Kharakt Ristik Pribora Plya Izmereniya Sveshchennosti V Atmosfere Venere (Moscow), Report PR-341, 1977 21 p. Subm-Transl. By Scientific Translation Service, Santa Barbara, Calif. Original Document Prepared by Academy of Sciences (Ussr), Moscow.

A procedure is described for obtaining the calibration, angular and spectral characteristics of a broad band photometer used on Venera 9 and 10 spacecraft to measure the illuminance regime in five spectral intervals with respect to three directions. The photometer has three identical groups of photoreceivers on which light falls through fiber light guides. Each group contains three cadmium sulfide photoresistors with light filters, a cadmium selenide photoresistor and a silicon photodiode. The temperature of the photoreceivers is measured by thermistors installed in series with the receivers.

N79-34082/4 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Perturbation Method on the Study of the Interaction of the Solar Wind with Comets Metodo de Perturbacoes No Estudo DA Interacao Do Vento Solar COM Cometas.
R. A. Medrano-b. Jul 79, 15p INPE-1529-RPE/061
Misc-Revised. Conf-Presented at the 31ST Reuniao Annual DA Soc. Brasil. Para O Progr. Da Cienc. (Sbpc), 11-18 Jul. 1979.
Language in Portugese.

A hydrodynamic model as well as one in an interplanetary field by were used to study the solar wind-comet interactions. The problem was solved considering that energies in the B fields were smaller than energies of the solar wind at distances of 1Ua from the sun. An analysis on the balance of pressure at both sides of the stock waves indicate that the size of the fields where the noise is contained is considerably reduced. First order perturbation equations with a solution based on zero order restored the particles to 3 degrees of freedom.

N79-34130/1 PC **A02**/MF **A01**
California Inst. of Tech., Pasadena.
Support for Joint Infrared and Copernicus X-Ray Observations of Cygnus X-3.
Final Report.
26 Oct 79, 14p NASA-CR-162357
Grant NSG-5208

Simultaneous X-ray and infrared measurements were carried out of the flares from Cygnus X-3 from the Copernicus spacecraft observatory. The detectors, InSb, were arranged so that 1.65 and 2.2 micrometer broadbend photometry was performed through a common diaphragm. The measurements were used to determine the energy distribution during a flare and thus learn about the infrared spectrum and its changes during the flare.

N79-34131/9 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
HEAO-A2 Observations of the X-Ray Spectra of the Centaurus and A1060 Clusters of Galaxies.
R. Mitchell, and R. Mushotzky. Oct 79, 30p NASA-TM-80566

The X-ray spectral observations of two low luminosity clusters of galaxies, Centaurus and A1060, are presented. An emission feature of the Centaurus cluster at 7.9 keV is detected at about one third of the strength of the 6.7 keV line. This higher energy line represents K sub beta emission from highly ionized iron. An isothermal model with an Fe emission line is discussed and it is shown that the model cannot fit the data of the Centaurus or the A1060 clusters. The implications of the two component nature of the continuum on the Fe abundance and the X-ray surface brightness distribution are discussed.

N79-34132/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Elemental Abundances in a Type I SNR.
R. H. Becker, S. Holt, B. W. Smith, N. White, and E. Boldt. Sep 79, 13p NASA-TM-80561
Subm-Submitted for Publication.

The solid state spectrometer on the HEAO-2 X-ray observatory observed the X-ray spectrum of Tycho's SNR. The observations show a relative excess of line emission from Si, S, and Ar by or = 6 compared to that expected from a plasma of solar composition in collisional equilibrium and by a factor of or = 3 compared to Cas A. Similar excesses are not found for line emission from Mg and Fe. The data suggest that the SN observed by Tycho in 1572 produced significant amounts of Si group elements but did not eject large amounts of Fe as predicted by some models of Type I SN events.

N79-34133/5 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Interplanetary Sector Boundaries, 1971 - 1973.
L. Klein, and L. F. Burlaga. Sep 79, 35p NASA-TM-80565
Subm-Submitted for Publication.

Eighteen interplanetary sector boundary crossings observed at 1 AU by the magnetometer on the IMP-6 spacecraft are discussed. The events were examined on many different time scales ranging from days on either side of the boundary to high resolution measurements of 12.5 vectors per second. Two categories of boundaries were found, one group being relatively thin and the other being thick. In many cases the field vector rotated in a plane from one polarity to the other. Only two of the transitions were null sheets. Using the minimum variance analysis to determine the normals to the plane of rotation, and assuming that this is the same as the normal to the sector boundary surface, it was found that the normals were close to the ecliptic plane. An analysis of tangential discontinuities contained in 4-day periods about the events showed that their orientations were generally not related to the orientations of the sector boundary surface, but rather their characteristics were about the same as those for discontinuities outside the sector boundaries.

N79-34134/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
X-Ray Evidence for Electron-Ion Equilibrium and Ionization Nonequilibrium in Young Supernova Remnants.
S. H. Pravdo, and B. W. Smith. Sep 79, 18p NASA-TM-80558

The A-2 spectroscopy experiment on HEAO 1 detected X-ray emission up to 25 keV from the supernova remnants Cas A and Tycho. The spectra must include continuum components with effective temperature equivalent or 10 to the 8th power K which could arise from optically thin plasmas in the collisionless shock fronts. This is the first indication of electron-ion temperature equilibrium in the expanding shell of young remnants. Measurements of the equivalent widths of the K alpha and K beta iron line blends in Cas A, show that their ratio is not compatible with the measured X-ray temperature in the collisional ionization equilibrium model. The search for hard X-ray pulsars in both remnants was unsuccessful.

N79-34135/0 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
General Properties of HII Regions in Galaxies.
M. A. Smirnov, and B. V. Komberg. Oct 79, 33p NASA-TM-75700
Contract NASW-3199
Tran-Transl. Into English of Obshchiye Svoystva Zon Hii V Galaktikakh (Moscow), Report PR-315, 1977 p 1-38. Subm-Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original Document Prepared by Academy of Sciences (Ussr), Moscow.

The structure, electron density, and dimensions of HII regions in galaxies are discussed. These parameters are correlated to the chemical composition gradient along the galactic radius, the dimensions of the three largest HII regions in the galaxy, and the amount of hydrogen in the galaxy, as well as the mass, dimensions, and total optical luminosity of the galaxy. The relationships of HII regions to star formation and galactic nucleus activity are discussed and the kinematic properties of the SB and Sab galaxies are related to the size of HII regions.

N79-34137/6 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A Catalog of Jovian Decameter-Wave Radio Observations from 1957 - 1978.
J. R. Thieman. Aug 79, 37p NASA-TM-80308

Data from over 200,000 hours of observation of Jupiter radio emission in the decameter-wavelength band, were collected from 13 observing sites and are available on magnetic tape. Observations were made at 14 fixed frequencies from 5 to 30 MHz. The characteristics of the tape recording technique and the data format are described. The combination of overlapping data from observing sites scattered world-wide lessens the effect of the earth's daily interruption of the ground-received signal. A power spectral analysis of the data shows no evidence of periodicities within the data other than the well-known influences of Jupiter, Io, and the earth. The dependence of the occurrence probability of emission on System 3 longitude and the phase of Io varies smoothly with frequency down to 15 MHz and then appears quite different at 10 MHz. The morphology of the radio sources is both complex and stable for periods of at least months and probably much longer.

N79-34138/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Magnetic Field Studies at Jupiter by Voyager 2: Preliminary Results.
N. F. Ness, M. H. Acuna, R. P. Lepping, L. F. Burlaga, and K. W. Behannon. Aug 79, 27p NASA-TM-80556
Subm-Submitted for Publication.

The Voyager 2 magnetic field experiment is described and compared to the Voyager 1 experiment and data. The magnetosphere, the bow shock, the magnetopause, and the extended magnetic tail of Jupiter are discussed. Two crossings of the near equatorial current sheet were observed in the magnetosphere and its tail every 10 hour rotation period of the planet. A definitive mapping of the geometry and character of these enhanced plasma and depressed magnetic field regions is discussed. The interaction of the satellite Ganymede with the Jovian magnetosphere, which leads to disturbances as the Jovian magnetosphere corotates with the planet past the satellite is analyzed.

N79-34141/8 PC **A03**/MF **A01**
Solar Physics Research Corp., Tucson, Ariz.
Energy Transport Through the Solar Atmosphere.
Final Technical Report.
K. L. Harvey, and J. W. Harvey. 31 Aug 79, 38p NASA-CR-161316
Contract NAS8-33104

The energy transport through the solar atmosphere and the source of energy which heats the chromosphere and the solar corona are studied. Wave propagation in the solar atmosphere and in the heating of the solar atmosphere is discussed as a source and transport medium. The source of the waves is thought to be the photospheric short period oscillations. Simultaneous observations from the photosphere to the corona at the solar disk center are reported. Emphasis is on the possible association of aperiodic brightenings high in the atmosphere with specific events in the photosphere.

N79-34142/6 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Microscale Instabilities in Stream Interaction Regions.
A. Eviatar, and M. L. Goldstein. Aug 79, 51p NASA-TM-80560
Subm-Submitted for Publication.

The microstructure of solar wind stream interaction regions is considered theoretically with emphasis on the role of several electrostatic kinetic instabilities which may be important within the stream interface and the compression region. Inside of 1 AU, the interface is likely to be stable against the electrostatic streaming instabilities considered. Between 1 and 2 AU, the interface will excite the magnetized ion-ion instability. The compression region is also found to be unstable beyond 1 AU where the modified two-stream instability, beam-cyclotron instability, and ion-acoustic instability are important in determining the structure of the compressive pulses as they evolve into forward and reverse shocks. It is concluded that the modified two-stream instability and beam-cyclotron instability predominately play a role in heating the electrons to the threshold for the ion-acoustic instability. Various electrostatic plasma waves, ranging in frequency from the lower-hybrid to harmonics of the electron cyclotron frequency, would be produced by these instabilities. Their signature should also be seen by high time resolution measurements of the temperature of the various plasma species.

N79-34143/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
The Hard X-Ray Burst Spectrometer on the Solar Maximum Mission.
L. E. Orwig, K. J. Frost, and B. R. Dennis. Aug 79, 25p NASA-TM-80337
Subm-Submitted for Publication.

The primary scientific objective of the spectrometer is to provide a greater understanding of the role of energetic electrons in solar flares. This will be achieved by observations of high energy X-rays in the energy range from 20 to 200 keV with time resolution of 0.128s on a continuous basis and as short as 1 ms for limited intervals. The X-ray detector is an actively shielded CsI(Na) crystal with a thickness of 0.635 cm and a sensitive area of 71 sq cm. In the first year after launch, it is expected that approximately 1000 flares above the sensitivity threshold of 0.2 photons/(sq cm s) lasting for one second, will be detected.

N79-34144/2 PC **A02**/MF **A01**
Colorado Univ., Boulder.
Study of the Solar Corona Using Radio and Space Observations.
Final Technical Report, 1 Oct. 1978 - 31 Oct. 1979.
G. A. Dulk. 31 Oct 79, 12p NASA-CR-162367
Grant NSG-7287

Optical, radio and X-ray evidence of violent mass motions in the corona has existed for some years but only recently have the form, nature, frequency and implication of the transients become obvious. The observed properties of coronal transients concentrating on the white-light and radio manifestations. The possible mechanisims involved in the radio bursts are discussed. The estimates of various forms of energy are reviewed. It appears that the magnetic energy transported from the Sun by the transient exceeds that of any other form, and that magnetic forces dominate in the dynamics of the motions. The conversion of magnetic energy into mechanical energy, by expansion of the fields, provides a possible driving force for the coronal and interplanetary shock waves.

N79-34152/5 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Observations of Extraterrestrial gamma Ray Beams Using a High Angular Resolution Telescope Observacoes de Fontes de Raios Gama Extraterrestres Com Um Telescopio de Alta Resolucao Angular.
J. O. D. Jardim, K. R. Rao, O. D. Deaguiar, and I. M. Martin. Jun 79, 10p INPE-1498-RPE/040
Misc-Revised. Conf-Presented at the 6TH Reuniao Anual DA Soc. Astron. Brasil. - Sab, 4-6 Jul. 1979.
Language in Portugese.

Results are presented of measurements made using a high angular resolution telescope of low energy Gamma rays in the region of 0.34-5MeV. Observations of the origin of Sco X-1 in the Galactic Center during this flight are reported.

N79-34153/3 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
The Frozen-in Effect of Cosmic Plasmas Efeito Do Congelamento (Frozen-in) Em Plasmas Espaciais.
R. A. Medrano-b. Jul 79, 10p INPE-1530-RPE/062
Language in Portugese.

The frozen-in effect and the diffusion of the solar wind and its interactions with planetary and comet ionospheres lacking intrinsic magnetic fields is presented. It was concluded that depending on the ionospheric conductivity, a neutral layer can be formed in the ionosphere. The qualitative models depict the case of two comets when they are in the vicinity and away from the sun respectively.

N79-34154/1 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Gamma Nuclear Lines Produced in Supernovae and the Possibility of Detection Linhas Gama Nucleares Produzidas Em Supernovas E Possibilidade de Deteccao.
J. O. D. Jardim. Jul 79, 16p INPE-1517-RPE/053
Misc-Revised. Conf-Presented at the 31TH Reuniao Annual DA Soc. Brasil. Para O Progr. Da Cienc. (Sbpc), 11-18 Jul. 1979.
Language in Portugese.

The nuclear fusion reaction which results in the origin of a supernova is studied. These explosive nuclear synthesis occur between two elements of atomic weights between 28 and 57 as well as in reactions produced by high energy particles surrounded by gas. In the Galaxy N6C5236 the nuclear Gamma lines are best observed, since there are more of these phenomenons occuring there.

N79-34155/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Asymptotic Freedom in the Early Big-Bang and the Isotropy of the Cosmic Microwave Background.
F. W. Stecker. Sep 79, 13p NASA-TM-80562
Subm-Submitted for Publication.

The isotropy of the universal 3K background radiation is discussed and a superunified field theory incorporating gravity and possessing asymptotic freedom is suggested to provide a solution to the problem. Thermal equilibrium is established in this context through interactions occurring in a temporally indefinite preplanckian era.

3C. Celestial Mechanics

N79-33140/1 PC **A02**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Nutation of Mars.
R. A. Lyttleton, D. L. Cain, and A. S. Liu. 15 Aug 79, 14p NASA-CR-162300, JPL-PUB-79-85
Contract NAS7-100

The mathematical theory of the nutation of Mars is derived by classical rigid-body dynamics. The effect of nutation is to produce a 26-m maximum horizontal amplitude oscillation (at the surface of Mars) with a period of half a Martian year. This effect should be detectable in the Viking-Lander data.

4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

AD-A075 044/8 PC **A02**/MF **A01**
Boston Univ Mass Dept of Astronomy
The High-Latitude Behavior of hmF2 and NmF2 along the Noon-Midnight Meridian under Quiet Conditions,
C. C. Chacko. 16 May 78, 5p AFGL-TR-79-0230
Contracts F19628-78-C-0011, F19628-75-C-0044
Pub. in Jnl. of Geophysical Research, v83 nA12 p5733-5736, 1 Dec 78.

No abstract available.

AD-A075 071/1 Not available NTIS
Illinois Univ At Urbana-Champaign Dept of Electrical Engineering
Ionospheric Bubbles Observed by the Faraday Rotation Method at Natal, Brazil,
K. C. Yeh , H. Soicher , C. H. Liu , and E. Bonelli. 9 Mar 79, 3p ARO-14260.7-ELX
Grant DAAG29-78-G-0101
Availability: Pub. in Geophysical Research Letters, v6 n6 p473-475 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 114/9 PC **A04**/MF **A01**
Webb Associates Inc Yellow Springs Ohio
The Precipitating Electron Detectors (SSJ/3) for the Block 5D/Flights 2-5 DMSP Satellites: Calibration and Data Presentation.
Final rept. 1 Jan 77-30 Sep 78,
M. S. Gussenhoven , D. A. Hardy , and A. Huber. Aug 79, 64p AFOSR-TR-79-1060
Contract F49620-77-C-0050
See also AD-A074 989.

The work under this contract had as its goal the time-dependent phenomenological modeing of the polar cap regions. The vehicle for modeling the caps has been to analyze the following collection of data: DMSP images showing polar cap auroras; DMSP electron measurements; hourly averages of the interplanetary magnetic field; ground magnetometer data from Thule; and magnetic indices. DMSP images from the winters of 1972-1973 and 1974-1975 provided consistently good records of the northern polar cap region and were used as the primary basis of the study. The DMSP images for these periods were traced and gridded in corrected geomagnetic coordinates and local geomagnetic time. The subset of cases for which auroras occur at above 80 degrees corrected geomagnetic latitude was identified and further categorized by local time interval of occurrence (morning, midnight, evening sectors). The occurrence of extremely high latitude aurora in each category was correlated with magnetic indices, magnetometer response at Thule, and solar wind parameters. The correlation of cap size as determined by poleward auroral boundaries, and the time variation of these with the above parameters was also made. (Author)

AD-A075 151/1 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB Ma
The Use of Offset Dipole Coordinates for Interpolating Cosmic Ray Cutoff Rigidities in Three Dimensions,
D. F. Smart , and M. A. Shea. 1977, 8p Rept no. AFGL-TR-79-0215
Pub. in Proceedings of the International Cosmic Ray Conference (15th), v11 p256-261 1977.

No abstract available.

AD-A075 168/5 PC **A06**/MF **A01**
Air Weather Service Scott AFB Il
Electro-Optical Handbook. Volume I. Weather Support for Precision Guided Munitions,
Kit G. Cottrell , Paul D. Try , Donald B. Hodges , and Ronald F. Wachtmann. May 79, 108p Rept no. AWS/TR-79/002

A foundation for weather support to Precision Guided Munitions operating at visual through microwave wavelengths is established for use by Air Weather Service base weather station forecasters and staff weather officers. Chapter 1 describes the effects of the atmosphere and the earth's surface on electromagnetic energy. Precision Guided Munitions (PGMs) and their sensitivities to the environment are discussed in Chapter 2. The next two chapters discuss weather support concepts and techniques to support PGMs. A glossary of terms, supplemental radiative transfer theory, and example worksheets illustrating support techniques to TV, infrared, and laser designator systems are included in the appendixes. (Author)

AD-A075 176/8 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
From Experience of Studying the Pollution of Atmospheric Air with 3,4-Benzopyrene in Regions of the Location of Industrial Enterprises,
Zh. L. Gabinova , A. A. Vasil'yeva , N. Kh. Sklyarskaya , and M. D. Manita. 14 May 79, 20p Rept no. FTD-ID(RS)T-0605-79
Edited trans. of Gigiyena i Sanitariya (USSR) n6 p65-69 1963, by Carol S. Nack.

No abstract available.

AD-A075 207/1 PC **A02**/MF **A01**
Aerospace Corp El Segundo Ca Space Sciences Lab
Correlated Observations of Auroral Arcs, Electrons, and X-Rays from a DMSP Satellite.
Interim rept.,
Paul F. Mizera , Janet G. Luhmann , Wojciech A. Kolasinski , and J. Bernard Blake. 28 Sep 79, 22p TR-0079(4960-05)-2, SAMSO-TR-79-53
Contract F04701-78-C-0079

The first simultaneous observations, made from a single DMSP satellite, of visible auroral arcs, precipitating primary electrons, and atmospheric bremsstrahlung x-rays are presented for a moderately disturbed auroral event. Measured electron fluxes were used to compute absolute x-ray distributions expected at the satellite altitude. The agreement between the calculated and measured x-ray spectra is sufficiently good to suggest that global auroral energy input can be monitored by an orbiting x-ray spectrometer. (Author)

AD-A075 281/6 PC **A04**/MF **A01**
Lockheed Missiles and Space Co Inc Palo Alto Ca
Palo Alto Research Lab
Analysis of Satellite Data on Precipitating Particles in Coordination with ELF Propagation Anomalies.
Final rept. for period ending 30 Sep 78,
William L. Imhof, Trygve R. Larsen, Joseph B. Reagan, Edward E. Gaines, and Robert C. Gunton. 30 Nov 78, 72p Rept no. LMSC/D633266
Contract N00014-75-C-0954

An investigation has been made of the effects of energetic particle precipitation into the atmosphere on the transmission of ELF signals based on coordinated data acquired during the Greenland Sea exercise in 1977, and at other times. In the Greenland Sea exercise significant fluxes of precipitating electrons were measured on many of the satellite passes and unusually high intensities were observed on several occasions, two of which were selected for special study. A search was made for possible correlation between electron precipitation and ELF signal strength, but no evidence was found for a consistent variation between the two parameters. This finding may partly reflect the uncontrolled and variable receiving conditions during the Greenland Sea exercise. For two of the major electron precipitation events observed in the April-May 1977 Greenland Sea exercise, detailed analyses were performed of the electron energy spectra and intensities, and of the resulting energy deposition profiles. For each of the electron density profiles, calculations of the ELF signal strengths were performed with the waveguide-mode computer program developed at the Naval Ocean Systems Center. From these calculations taken together with computations for other events it became clear that the received signal may either increase or decrease, depending upon the spatial extent and location of ionization. The predicted effects of a single relativistic electron precipitation event are not severe, but due to their frequent occurrence they may provide the opportunity to verify experimentally the predicted effects of more severe and rarely occurring phenomena such as solar particle events.

AD-A075 294/9 Not available NTIS
Iowa Univ Iowa City Dept of Physics and Astronomy
Intense Electrostatic Waves Near the Upper Hybrid Resonance Frequency,
W. S. Kurth , J. D. Craven , L. A. Frank , and D. A. Gurnett. 31 Jan 79, 20p
Contracts NAS1-13129, NAS5-11074
Sponsored in part by Grant NGL-16-001-043.
Availability: Pub. in Jnl. of Geophysical Research, v84 nA8 p4145-4164, 1 Aug 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 356/6 PC **A03**/MF **A01**
Weston Observatory Mass
Investigation of Magnetic Field Phenomena in the Ionosphere,
John F. Devane , and Edward A. Johnson. Jan 79, 32p SCIENTIFIC-1, AFGL-TR-79-0044
Contract F19628-76-C-0291

This report summarizes the work in maintaining a network of geomagnetic observatories designed to collect and digitally transmit variations of the geomagnetic field. Lightning protection was designed and installed on the induction coil magnetometers. Power supplies of the fluxgate magnetometers were updated, scale changes modified, cooling capacity increased. New temperature control of trailers installed. The changing total field component is traced over the past five years and a method of calibrating the fluxgate magnetometer is outlined.

AD-A075 443/2 PC **A03**/MF **A01**
Dayton Univ Oh Research Inst
1977 ROBIN Program - User's Manual.
Technical rept.,
John F. Myers , and James K. Luers. Jul 79, 41p ERADCOM/ASL-CR-79-0020-1
Contract DAAD07-78-C-0020

The Robin 77 or revised High Altitude Robin Program is specifically designed for computer reduction of Robin flights which attain an apogee of approximately 125 km, and are tracked by an FPS/16 radar. The program also provides accurate reduction for Robin flights attaining other apogees between 65 and 150 km. If a passive sphere other than the 1-m Robin (approximately 115 g) is used, reduction with this program is still possible. There may be times, however, when drag coefficients are not available and thus density, temperature, and pressure cannot be computed. The time of fall test used to determine sphere collapse is not used for spheres with dimensions that differ from the Robin. At each second of flight, the program calculates altitude, wind components and direction, density, temperature, and pressure, the RMS noise error in winds, density, temperature and pressure, and other balloon dynamics. (Author)

AD-A075 519/9 PC **A02**/MF **A01**
Science Applications Inc La Jolla Ca
Satellite Measurements of Tropospheric Aerosols.
Technical rept.,
M. Griggs. 30 Aug 79, 17p Rept no. SAI-011-79-1004-LJ
Contract N00014-77-C-0489
Presented at the Annual International Symposium (23rd), of the Society of Photo-Optical Instrumentation Engineers (SPIE), San Diego, CA. 29 Aug 79.

Landsat data were originally used to demonstrate that a linear relationship exists between the upwelling visible radiance and the aerosol optical thickness (essentially all of this thickness is in the troposphere) over oceans. Since that time similar relationships have been shown to exist for sensors on the GOES and NOAA-5 satellites. A global scale ground truth experiment using Tiros-N data is planned and will investigate the variability of the linear relationship at different sites around the globe. A comparison of the results for the different satellites is presented, together with a discussion of the requirements for routine satellite monitoring of tropospheric aerosols on a global scale. (Author)

AD-A075 555/3 PC **A02**/MF **A01**
Naval Weapons Center China Lake Ca
Atmospheric Refraction and the Effective Earth's Radius: Problems and Pitfalls.
Technical memo.,
William M. Cornette. Jan 77, 23p Rept no. NWC-TM-3028

The derivation of a transformation to compensate for refractivity in the earth's atmosphere is obtained through the use of ray tracing and differential geometry. The effective earth's radius, which is the classical method to compensate for the ray curvature as an electromagnetic wave propagates through the earth's atmosphere, is also derived and shown to be invalid since it does not serve its intended purpose -- namely, to conformally transform curved rays into straight lines. A breif review of atmospheric radio refractivity and ray tracing is presented and the differences between the refraction compensation transformation and the effective earth's radius are demonstrated. (Author)

N79-32247/5 PC **A08**/MF **A01**
Dornier-System G.m.b.H., Friedrichshafen (Germany, F.R.).
Magnetosphere Sounding Rocket Program. A Substorm Phenomena Payload. Report on System Design, Integration, Testing, and Flight.
Final Report.

H. H. Pechstein, W. Schnattinger, E. Waffenschmidt, W. Schrieder, and F. Gampe.
Dec 78, 170p BMFT-FB-W-78-35
Contracts BMFT-WRK-0274, DFVLR-BPT-01-OM-036
In German; English Summary.

As part of the rocket sounding campaign conducted in Andenes, Norway, from September 1977 to January 1978, four identical payloads for the investigation of the magnetosphere response to magnetic substorms were developed, built, and qualified. The experiment package was designed for use in a Skylark 12 nose cone. All four units were successfully flown during substorm events. Details on the development, manufacturing, testing, and launch preparation of these payloads are given. The post flight reports filed on the performances of the experiments and the rockets are also included.

N79-32253/3 PC **A03/MF A01**
Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (Germany, F.R.).
Aeronomy Sounding Rocket Program. Results of the Guard Ring Probe Experiment Flown on the Payload B1 of the National Aeronomy Winter Anomaly and Trace Constituents Program at El Arenosillo, Spain, Between December 1975 and January 1976.
Final Report.
H. U. Widdel. Nov 78, 35p BMFT-FB-W-78-26
Contracts BMFT-WRK-0274, DFVLR-BPT-01-D1-173
In German; English Summary.

The guard ring probe experiment which was flown during the aeronomy program 15 times is briefly described and the results obtained are given. The fairly high frequency of launches made it possible to follow in quite some detail the development of so-called waves of winter anomalously high absorption. It was found the development of such a winter anomaly wave was preceded by a change in the numeric density of negative ions below 60 km. This change cannot be observed by ground-based absorption measurements using short wave radio waves. The observation can be interpreted as the result of a depletion of the water content of the mesosphere which also comprises lower heights. A possibility for an experimental verification of this interpretation is suggested.

N79-32780/5 PC **A02/MF A01**
National Physical Lab., Teddington (England). Div. of Quantum Metrology.
Spectral Lineshape Calculation for a Stratospheric Emission Model.
D. P. Rice. Apr 79, 17p NPL-QU-50

A metnod of computing the Voigt line profile which is specifically designed for use in calculations of stratospheric emission is described. The method is accurate to one part in a thousand and is economical in computer time. The shape of a typical emission line of ozone at various altitudes in the atmosphere is calculated and displayed. A FORTRAN IV subroutine for use in computing the Voigt lineshape is included in the appendix.

N79-32781/3 PC **A03/MF A01**
Akademiya Nauk SSSR, Moscow. Inst. of Space Research.
The Magnetic Field Structure on the Magnetosphere Boundary.
E. M. Dubinin, I. M. Podgorny, and Y. N. Potanin. 1978, 29p PR-440

Magnetic field structure was studied on the dayside of the artificial magnetosphere formed by the interaction of the supersonic and superalfven collisionless plasma flow with the magnetic dipole. The plasma flow contained the intensity and direction controlled frozen-in magnetic field. It is shown that the magnetic curl at the dayside formed due to the reconnection of fields in the region of polar clefts and can disintegrate into smaller magnetic curls or islands. Simultaneous measurements with two magnetic probes made it possible to estimate the typical scale of such formations. The field structure on the boundary is studied with the southern and northern components of the frozen-in magnetic field. A gradual turn of the magnetic field vector before the magnetopause was observed. Laboratory data are compared with the results obtained from space measurements as well as with various theoretical models and results are illustrated.

N79-32783/9 PC **A02/MF A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
Electric Fields in the Outer Magnetosphere: Recent Progress and Outstanding Problems.
C. G. Faelthamur. Mar 79, 8p TRITA-EPP-79-03
Conf-Presented at Intern. Workshop on Selected Topics of Magnetospheric Phys., Tokyo, 12-16 Mar. 1979.

The electric field is a crucial parameter in theories of solar wind interaction with the magnetosphere. Using experiments on board the satellites ISEE-1, GEOS 1, and GEOS 2 this parameter has, for the first time, been directly measured in the interacting regions: outer magnetosphere, magnetopause, magnetosheath, bow shock, and the adjacent solar wind. Among the first results are the verification of a large-scale dawn-to-dusk tangential electric field component at the magnetopause of typically 1 - 2 mV/m and a corresponding power dissipation of 50 W/sq km. The normal component of the electric field is typically of the same order of magnitude as the tangential component. Fine structure features, possibly related to the entry of plasma, remain to be analyzed.

N79-32784/7 PC **A03/MF A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
An Electric Current Model of the Magnetosphere.
H. Alfven. May 79, 26p TRITA-EPP-79-09

A translation of the traditional field description of the magnetosphere into a particle (electric current) description is presented. Emphasis is placed on the energy transfer from the solar wind. The solar wind flow through the magnetic field acts as an electric generator. Its power is transferred to the magnetosphere through four main circuits. These are the magnetopause circuit, the solar wind-auroral circuit, the tail circuit, and the front circuit. A fifth circuit, the substorm circuit, is also discussed. When the tail circuit flares the current is partly redirected over the auroral zone, flowing in what is designated as the substorm circuit.

N79-32785/4 PC **A03/MF A01**
Danish Meteorological Inst., Copenhagen.
The Relationship Between Ionospheric and Field Aligned Currents in the Dayside Cusp.
J. Wilhjelm, E. Friis-christensen, and T. A. Potemra. 1978, 30p DMI-GEOPHYS-PAPERS-R-53, ISBN-87-7478-158-8
Subm-Submitted for Publication.

Observations of field-aligned currents determined from magnetic disturbances measured with the TRIAD satellite near local magnetic noon were compared to simultaneous magnetic perturbations observed at the ground with a dense chain of magnetic observatories located along the west coast of Greenland. The investigation reveals that the equivalent ionospheric currents at the dayside polar cusp are located between two field aligned current sheets, and the direction of the equivalent ionospheric current depends upon the directions of the two fields aligned currents in a manner consistent with the assumption that the equivalent ionospheric current represents an ionospheric Hall current.

N79-32786/2 PC **A03/MF A01**
Danish Meteorological Inst., Copenhagen.
Thule Geophysical Observatory: Magnetic Results, 1950.
1978, 32p ISBN-87-7478-135-9

Tables show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.

N79-32787/0 PC **A03/MF A01**
Danish Meteorological Inst., Copenhagen.
Thule Geophysical Observatory: Magnetic Results, 1951-1952.
1978, 47p ISBN-87-7478-136-7

The results of the standard observation carried out at the Thule magnetic laboratory from 1951 to 1952 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.

N79-32788/8 PC **A03/MF A01**
Danish Meteorological Inst., Copenhagen.
Thule Geophysical Observations: Magnetic Results, 1955-1956.
1978, 45p ISBN-87-7478-137-5

The hourly means values of the horizontal and vertical intensity, and magnetic declination are presented in tables.

N79-32789/6 PC **A03/MF A01**
Danish Meteorological Inst., Copenhagen.
Rude Skov Geophysical Observatory: Magnetic Results, 1977.
A. Hansel. 1978, 42p ISBN-87-7478-161-8

The results of the standard observations carried out at the Rude Skov magnetic laboratory during 1977 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.

N79-32791/2 PC **A02/MF A01**
Uppsala Ionospheric Observatory (Sweden).
Lower Ionosphere Ion Production Density and Composition in an Auroral Absorption Event.
L. G. Bjoern, F. Arnold, D. Krankowsky, B. Grandal, and O. Hagen. 1978, 22p UIO-SR-79-01
Subm-Sponsored by Swed. For Space Activities Submitted for Publication.

A payload instrumented to measure energetic particle precipitation, ionization density, and composition of ions as well as neutral constituents in the D and lower E regions was launched on February 21, 1976 from Esrange into an auroral absorption event. Energetic particles were measured in the spectral range 40 to 800 keV. The reported ion composition measurements were made during rocket ascent at an altitude of from 60 to 104.6 km. Water cluster ions dominated below, 71 km above which height NO was the most abundant ionic species. A concentration of negative ions was found at 74 km. The importance of the formation of these ions on the loss rate and recombination life time of positive cluster ions and hence on the positive ion composition is discussed. From the measured ion composition an altitude profile of nitric oxide is derived showing a concentration between 700 million/cucm and 300 million/cucm in the height range from 80 to 100 km.

N79-32797/9 PC **A05/MF A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Earth Radiation Budget Science, 1978.
1978, 79p NASA-CP-2100
Conf-Workshop Held at Williamsburg, VA., 28-30 Mar. 1978.

No abstract available.

N79-33670/7 PC **A02/MF A01**
San Jose State Univ., Calif. Dept. of Meteorology.
Theoretical Studies of the Transport and Removal Processes of Sahara Dust.
Final Report, 1 Apr. - 30 Sep. 1979.
I. Y. Lee, and R. D. Bornstein. 30 Sep 79, 17p NASA-CR-162332
Subm-Sponsored by NASA.

The processes controlling the evolution of aerosol particles may be divided into dynamic processes concerned with the motions of air currents and microphysical processes concerned with the growth of the individual particles. The Ames planetary boundary layer model was modified to construct a subsynoptic scale aerosol model to study the long term fate of the Saharan dust. The transport model consists of a mixed layer, a convection layer, and free atmosphere. Conditions used for a preliminary test run and results obtained are described.

N79-33671/5 PC **A10/MF A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A Study of Inner Zone Electron Data and Their Comparison with Trapped Radiation Models.
M. J. Teague, N. J. Schofield, K. W. Chan, and J. I. Vette. Aug 79, 214p NASA-TM-80506, NSSDC/WDC-A-R/S-79-06

A summary and intercomparison of recent inner radiation zone electron data are presented. The morphology of the inner radiation zone is described and the data compared with the current generation of inner zone trapped electron models. An analytic representation of the inner zone equatorial pitch angle distribution is presented. This model was based upon data from eight satellites and was used to reduce all data to the form of equatorial flux. Although no Starfish-free high energy electron measurements were available from the inner portion of the inner radiation zone, it was found that the AE-6 model provided a good description of the present solar maximum environment.

N79-33672/3 PC **A05**/MF **A01**
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
Lightning Detection and Ranging System Ldar System Description and Performance Objectives.
H. A. Poehler, and C. L. Lennon. 20 Jun 79, 86p NASA-TM-74105

The instruments used at the six remote stations to measure both the time-of-arrival of the envelope of the pulsed 60 MHz to 80 MHz portion of the RF signal emitted by lightning, and the electric field waveforms are described as well as the two methods of transmitting the signal to the central station. Other topics discussed include data processing, recording, and reduction techniques and the software used for the 2100S, 2114, and 2116 computers.

N79-33674/9 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Determination of Nitric Oxide Height Distribution from Rocket Ion Composition Results at Low Latitudes.
M. A. Abdu, and I. S. Batista. May 79, 16p INPE-1493-RPE/037
Misc-Revised.

Ion composition results from rocket measurements in the D and E region were analyzed using presently known complete ion chemistry schemes to determine the distribution of nitric oxide in this height region. The method of analysis uses, as input, an atmospheric model and the ion production rates due to X-rays, and yields the height distribution of nitric oxide and production rates of the major initial ions NO(+) (for a given Lyman alpha flux) and O2(+). Analyses were carried out for Cassino, Brazil, a southern temperate latitude station and for Thumba, India, a northern low latitude station. The results are compared with available nitric oxide distributions from the NO gamma band measurements. The role of mesospheric water vapor and temperature on the deduced D region NO distribution is discussed.

N79-33676/4 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Irregularities in the Global Distribution of Total Electron Content.
R. P. Kane. Aug 79, 13p INPE-1524-RPE/064
Misc-Revised.

The day-to-day variability of daytime total electron content (TEC), at several locations, is compared to that at the midlatitude station Hamilton for quiet as well as disturbed days in 1969. It is noticed that all these changes are seldom parallel. Sometimes, large north-south gradients are noticed while, at other times, TEC seems to pile up on either side (latitudinally) of Hamilton. On some occasions, TEC in the Southern Hemisphere midlatitude is smaller than that at Hamilton for several consecutive days. It is concluded that TEC changes, at different latitudes, are neither parallel nor antiparallel in any consistent way and large scale random movements and/or long lasting TEC changes, probably due to height variations, are indicated. If all these are due to neutral winds, large scale vagaries of neutral winds during quiet as well as disturbed periods are indicated.

N79-33677/2 PC **A07**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Equatorial Enhancement of DP2 Fluctuations.
R. P. Kane, and N. B. Trivedi. Jul 79, 16p INPE-1519-RPE/055
Misc-Revised.

The fluctuations of geomagnetic H at the equatorial location Huancayo and the low latitude location Fuquene at the same longitude were compared during two DP-2 events. It was seen that, in contrast to the usual belief that these fluctuations are enhanced in the electrojet region in the same as the enhancement of normal Sq, the fluctuations were either abnormally enhanced or erratic in the early morning hours. Thus, some other factors besides the electrojet current strength (probably peculiar irregularities) seem to be involved in causing these equatorial enhancements.

N79-33678/0 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Mesospheric Ozone from Measurements of Ground Based Sodium Sounders.
V. W. J. H. Kirchhoff, B. R. Clemesha, and D. M. Simonich. May 79, 14p INPE-1495-RPE/039
Misc-Revised. Subm-Sponsored in Part by Fundo Nacional de Desenvolvimento Cientifico E Technologico, Brazil.

Mesospheric sodium was monitored from the ground by simultaneous observations of the neutral sodium densities and the sodium glow intensity. (The first parameter was measured by laser radar and the second by a tilting filter photometer.) Based on the Na photochemistry the ratio intensity/abundance is proportional to the ozone density close to the height of peak sodium emission (89 km). Using a two year set of sodium data, taken at Sao Jose dos Campos (23 deg S, 46 deg W) a number of features of the ozone density variations were determined. The average nocturnal behavior is one of constant ozone density, and a strong peak in ozone concentration is observed in autumn. The results also imply that the reaction rate for Na + O3 yields NaO + O2 must be larger than the usually quoted value of 6.5 x 10 to the minus 12th power cu cm/sec.

N79-33679/8 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Disturbances in the Nocturnal Thermosphere and of Its Phase Velocities in the Center of a Brazilian Geomagnetic Anomaly Perturbacoes NA Termosfera Noturna E Suas Velocida des de Fase No Centro DA Anomali Geomagnetic Brasileira.
J. H. A. Sobral, M. A. Abdu, I. S. Batista, Y. Sahai, and C. J. Zamlutti. Jul 79, 12p INPE-1531-RPE/063
Misc-Revised.
Language in Portugese.

Recent data of the nocturnal emission of OI 6300A and the ionosondes revealed interesting thermospheric perturbations in the form of wave propagation along the geomagnetic meridian. The sweep measurements of the spectra at 6300A were used to determine the apparent mid velocity of the phases of the 'peaks' and 'valleys' of the spatial distribution of the emission with values in the order of 200-300 m/s. Those perturbations were the first to be detected in that region. Their possible causes are discussed.

N79-33680/6 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Nitrous Oxide Concentration and Ionic Production Rate in the Lower Ionosphere as Determined by the Ionic Composition Data Obtained from a Rocket Concentracao de Oxido Nitroso E Taxa de Producao Ionica NA Baixa Ionosfera, Determindas Usando Dados de Composicao Ionica Obtidos COM Foguetes.
I. S. Batista. Jul 79, 17p INPE-1525-RPE/059
Misc-Revised. Conf-Presented at the 31TH Reuniao Anual DA Soc. Brasil. Para O Progr. Da Cienc. (Sbpc), 11-18 Jul. 1979.
Language in Portugese.

A method is presented to determine the concentration profiles of nitrous oxide and the rate of production in the D and E regions of the undisturbed ionosphere, at mid and low latitudes using ionic composition data obtained from rockets. The method consists of a complete chemical outline for the regions involved and the continuity equations for each individual ionic species. An atmospheric model and the alpha Lyman solar spectra were the parameters used since the ionic production rate is influenced by the X-rays. The influence of water vapor and the mesospheric temperature on the distribution of nitrous oxide in the ionospheric region is demonstrated.

N79-33682/2 PC **A06**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A Program for the Reduction of Ionograms: Analysis of the Ionospheric Behavior over Cachoeira Paulista During Magnetic Storms Programa Para Reducao de Ionogramas: Analise Do Comportamento Ionosferico Sobre Cachoeira Paulista Durante Tempestades Magneticas.
Master's Thesis.
A. C. Giese. Jul 79, 115p INPE-1522-TDL/011
In Portugese; English Summary.

One of the primary objectives of this work is the development of a detailed computer program for true height analyses of ionograms, with sufficient sophistication, so that the error in the determined true heights is reasonably small. The details of the program and its execution are described. It is then intended to undertake a study of ionospheric response to magnetic storms, over Cachoeira Paulista (22 deg 42 min S, 45 deg 01 min W), using true height analyses of the ionograms, during magnetic disturbances. Thus, study of magnetic storms, using true height analyses, forms the scientific goal of the work.

N79-33726/7 PC **A08**/MF **A01**
Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
Physical Characteristics Affecting the Atmospheric Boundary Layer Above Urban Areas.
W. Bahmann, and W. Behnke. Apr 77, 153p MITT-24
Subm-Sponsored by Min. Fuer Nissenschaft U. Forsch.
In German; English Summary.

No abstract available.

PB80-101736 Not available NTIS
National Oceanic and Atmospheric Administration, Boulder, CO. Aeronomy Lab.
Speculations on the Budget of Particulate and Vapor Phase Non-Methane Organic Carbon in the Global Troposphere,
Robert A. Duce. 1978, 31p NSF/IDOE-79/68
Grants NSF-OCE76-16883, NSF-ATM75-23725
Pub. in Pageoph, v116, p244-273 1978.

Perhaps less is known about the global source, distribution, and fluxes of non-methane organic matter than any other major class of chemical substances in the atmosphere. Source strength estimates and consideration of the available concentration data suggest that the quantity of organic carbon on large particles in the global troposphere can be explained by primary emissions from anthropogenic sources and such natural sources as the ocean, crustal weathering, and forest wildfires. However, these pollution and natural sources apparently cannot account for the global tropospheric burden of small particle organic carbon. Approximately 80-160 MT/yr of small particle carbon from some additional source is required to balance this cycle. Possibilities include direct production from the leaves of vegetation and gas to particle conversion of natural and anthropogenic organic carbon compounds. The estimated production of reactive vapor phase organic compounds from natural and pollution sources is sufficient to account for the mass of this additional small particle organic carbon. However, considerably more data is required on the global distribution, source strengths, reaction pathways and rates, and removal mechanisms before an accurate description of the non-methane organic carbon cycle can be made.

PB80-106859 PC **A15**/MF **A01**
National Environmental Satellite Service, Washington, DC. Meteorological Satellite Lab.

Earth-Atmosphere Radiation Budget Analyses Derived from NOAA Satellite Data, June 1974-February 1978. Volume I,
Jay S. Winston, Arnold Gruber, Thomas I. Gray, Jr., Marilyn S. Varnadore, and Charles L. Earnest. Aug 79, 338p NOAA-S/T-79-187-VOL-1, NOAA-79092712
See also Volume 2, PB80-106867.

Earth-atmosphere radiation budget data, as determined from the Scanning Radiometers (SR) aboard NOAA operational satellites, are presented in analyzed maps and profiles for the period June 1974 through February 1978. Monthly, seasonal, and annual averages are presented in two separate volumes. Volume 1 contains analyzed mapped fields and Volume 2 contains meridional profiles of zonal averages. The mapped data are displayed on a Mercator projection from 60 degrees N-60 degrees S and polar stereographic projections poleward of 50 degrees N and S. The quantities displayed are albedo, absorbed solar radiation, outgoing longwave radiation, and net radiation.

PB80-106867 PC **A15/MF A01**
National Environmental Satellite Service, Washington, DC. Meteorological Satellite Lab.
Earth-Atmosphere Radiation Budget Analyses Derived from NOAA Satellite Data, June 1974-February 1978. Volume II,
Jay S. Winston, Arnold Gruber, Thomas I. Gray, Marilyn S. Varnadore, and Charles L. Earnest. Aug 79, 338p NOAA-S/T-79-187-VOL-2, NOAA-79092713
See also Volume 1, PB80-106859.

Earth-atmosphere radiation budget data as determined from the Scanning Radiometers (SR) aboard NOAA operational satellites are presented in analyzed maps and profiles for the period June 1974 through February 1978. Monthly, seasonal, and annual averages are presented in two separate volumes. Volume 1 contains analyzed mapped fields and Volume 2 contains meridional profiles of zonal averages. The quantities displayed are albedo, absorbed solar radiation, outgoing longwave radiation, and net radiation. The profiles are based on zonal means at every 2.5 degrees latitude for the entire latitude circle and for three longitudinal sectors: 0 degrees-117.5 degrees E, 120 degrees E-122.5 degrees W, and 120.0 degrees W-2.5 degrees W. Albedo, absorbed solar radiation, and outgoing longwave radiation are displayed in profile form.

4B. Meteorology

AD-A075 040/6 PC **A02/MF A01**
Air Force Geophysics Lab Hanscom AFB Ma
Estimating Recurrence Probabilities of Weather Events,
Ivar A. Lund , and Donald D. Grantham. 11 Dec 78, 12p Rept no. AFGL-TR-79-0200
Pub. in Jnl. of Applied Meteorology, v18 n7 p922-930 Jul 79.

No abstract available.

AD-A075 086/9 Not available NTIS
Lamont-Doherty Geological Observatory Palisades N Y
Atmospheric Gravity Waves and Coastal Cyclones,
Stanley David Gedzelman , and William L. Donn. 20 Oct 78, 15p LDGO-2845, ARO-14846.6-GS
Grant DAAG29-77-G-0131
Availability: Pub. in Monthly Weather Review, v107 n6 p667-681 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 127/1 PC **A03/MF A01**
Foreign Technology Div Wright-Patterson AFB Oh
Two-Channel Weather Picture Receiver with Optimum Demodulator ZEA 1,
H. J. Fischer , V. Kempe , J. Rienaecker , and K. H. Schemelovsky. 24 May 79, 37p Rept no. FTD-ID(RS)T-0620-79
Edited trans of Radio, Fernsehen Elektronik (German D.R.) v20 n18 p585-590 1971, by Gale M. Weisenbarger.

No abstract available.

AD-A075 145/3 PC **A05/MF A01**
Army Electronics Research and Development Command Wsmr Nm Atmospheric Sciences Lab
Performance Evaluation of the Optical Crosswind Profiler.
Research and development rept.,
Ruben Rodriguez , and William J. Vechione. Aug 79, 82p Rept no. ERADCOM/ASL-TR-0038

Field measurements of integrated path crosswinds were made at Biggs Optical Range, Biggs Army Airfield, Fort Bliss, Texas, during the period of 31 january to 8 March 1978. The measurements were made with the Optical Crosswind Profiler (OCP), a bistatic system that measures crosswinds at six locations along its path by detecting and analyzing the movement of atmospheric scintillations. This report describes the performance evaluation test, test support equipment, and data collection methodology. Data collected with this sensor were compared to integrated path wind averages measured by the calibrated anemometer array. This report presents X-Y scatter plots, derived weighting functions, and wind measurement comparison plots. Results of this test showed that the alignment procedure is lengthy and tedious. Furthermore, simultaneous alignment of the six OCP sensors is very difficult to attain. However, once a sensor is aligned at 500 m, wind velocity values measured with it fall within 8 percent of the values obtained from the calibrated anemometr array. Operation at 2000 m is not reliable due to difficulties in obtaining and retaining alignment. (Author)

AD-A075 213/9 PC **A03/MF A01**
Naval Postgraduate School Monterey Ca
Determination of Vertical Wind Shear from Linear Combinations of Satellite Radiance Gradients: A Theoretical Study.
Technical rept. 1 Oct 78-22 Sep 79,
Henry E. Fleming. Sep 79, 44p Rept no. NPS63-79-004

By applying the thermal wind equation to the radiative transfer equation, one can derive the vertical wind shear from horizontal gradients of radiances measured by satellite. The vertical resolution of the wind shear can be optimized by using linear combinations of radiance gradients. A theoretical study was conducted to determine the optimal pressure intervals over which wind shears could be resolved when using weighting functions associated with the SSH sounder of the Defense Meteorological Satellite Program, and those associated with the TOVS instrument package on the TIROS-N/NOAA series of operational satellites. Two distinct computational approaches are presented and their respective results are summarized. (Author)

AD-A075 370/7 PC **A02/MF A01**
Duke Univ Durham N C School of Forestry
Utilization of Project Trend Instrumentation for Forest Microclimate and Energy Exchange Process Studies.
Final rept. 1 Jan 74-31 Dec 78,
K. R. Knoerr. 15 Sep 79, 6p ARO-12196.1-EN
Grant DAAG29-74-G-0086

Under the auspices of this grant an environmental instrumentation system, available from the U.S. Army Engineer's Project TREND, was obtained to facilitate Forest Meteorology research of interest to the U.S. Army. The attached report describes the servicing and reactivation of this instrumentation after its return from use in Thailand for a tropical forest environment study (Project TREND). Current and future applications of this instrumentation to forest meteorology and energy exchange research are also discussed. (Author)

AD-A075 390/5 PC **A08/MF A01**
Science Applications Inc El Segundo Calif
Rain Attenuation Over Earth-Satellite Paths.
Final rept. 27 Dec 78-25 May 79,
Nathaniel E. Feldman. May 79, 153p Rept no. SAI-171-80-573-LA
Contract N00039-79-C-0136

This analysis of precipitation-attenuation over earth-satellite paths extends R.K. Crane's model by correcting for measured total rainfall and frequency of occurrence. The authors convert Crane's model to a seasonal one and extend it up to 36 percent of the time. Four seasonal world maps show the location of the nine precipitation rate regions and another four show mean freezing height. A method for estimating the outage duration distribution is proposed and used to determine the mean daily outrage duration and the number of outages per day. (Author)

AD-A075 404/4 MF **A01**
Meteorology International Inc Monterey Calif
Monthly Mean and Standard Deviation Fields of Sea-Level Pressure and Surface Wind for the Northern Hemisphere.
Technical rept.,
Francis G. Caton , and Michael J. Cuming. Oct 78, 58p Rept no. MII-M-235
Contract N62271-78-M-1644
Availability: Document partially illegible.

In March 1978 there became available a Northern Hemisphere history of analyzed sea-level pressure fields and diagnosed wind fields covering the period January 1946 through December 1977 at 6-hourly intervals. These fields have been used to generate Data Sets containing monthly-mean, and all-years monthly-mean, fields of sea-level pressure and surface wind components together with associated fields of standard deviation. This Report is designed to be suitable for dissemination with data charts and/or data tape fields and provides background information; format specifications and contents of the new Data Sets. All-years monthly-mean fields of sea-level pressure and surface wind (speed and direction) are presented in the Appendices. (Author)

AD-A075 413/5 PC **A03/MF A01**
Meteorology International Inc Monterey Calif
Development of a Marine History of Analyzed Sea-Level Pressure Fields and Diagnosed Wind Fields.
Technical rept.,
Bruce R. Mendenhall , Manfred M. Holl , and Michael J. Cuming. Mar 78, 41p Rept no. MII-M-227
Contract N00228-76-C-3273

Using a highly-developed and flexible objective analysis technique, over 16.5 million synoptic observations made by ships at sea were blended with archived meteorological fields to produce re-analyzed sea-level pressure fields for the Northern Hemisphere on a 63x63 grid (polar stereograhic projection). These sea-level pressure fields, were used to diagnose sea-level wind fields for the same times. There are many potential uses for these high-quality fields of sea-level pressure and wind, the first application being to use the wind fields to drive the FNWC Spectral Wave Model--thus producing a 30-year 6-hourly set of wave fields. Other potential uses of the data bases established by the project are suggested in the Report. (Author)

AD-A075 456/4 PC **A03/MF A01**
Naval Environmental Prediction Research Facility Monterey Ca
Summary of an EASTPAC Refractive Structure Climatology.
Final rept.,
Wayne Sweet. Jul 79, 33p Rept no. NEPRF-TR-79-02

This report summarizes the most pertinent data and information contained in an earlier, in-depth refractive structure climatology, NEPRF TR 2-77 (MII), 'Development of a Synoptic Climatology of Tropospheric Refractive Conditions for the Eastern Pacific Ocean off the West Coast of the United States - Tasks One and Two.' Refractive structure data for five latitude zones of EASTPAC are given. Paragraph summaries discuss each of the selected statistics. (Author)

AD-A075 459/8 PC **A09/MF A01**
Army Armament Research and Development Command Aberdeen Proving Ground Md Ballistics Research Lab
Meteorological Measurements Program during Unified Navy Field Test Program.
Final rept.,
John M. Evans , John W. Kinch , and John H. McNeilly. Aug 79, 849p ARBRL-MR-02942, AD-E430 309

The Ballistic Research Laboratory participated with the Unified Navy Field Test Program conduct-

ed at the TRW Capistrano Test Site near San Clemente, CA from the fall of 1976-May 1978. Part of the BRL's responsibility in this program was to provide the meteorological measurements and analysis. These measurements provided the data required to determine optimum high energy laser propagation windows, and to predict propagation results. Meteorological parameters included in these measurements are the horizontal wind velocity normal to the propagation path, barometric pressure, wind speed and direction at several fixed points, strength of atmospheric optical turbulence, net and total solar radiation, temperature, dew point, and relative humidity. This report describes the measurement and recording techniques of the the meteorological parameters, and presents the data obtained.

AD-A075 490/3 PC **A03**/MF **A01**
University of Central Florida Orlando Dept of Mathematics and Statistics
Some Models for Visibility.
Rept. for 1 Sep 78-30 Jun 79,
Paul N. Somerville , Steven J. Bean , and Sherrill Falls. 30 Jun 79, 43p SCIENTIFIC-3, AFGL-TR-79-0144
Contract F19628-77-C-0080

Models for predicting the climatological probability of visibility less than a given number of miles at a given time and for twenty two diverse locations are developed. The two parameter Weibull distribution is used. The first models require the two parameter values for each month and three hour periods of the day (96 sets of two parameters) for each station. The second models are general models, and for each station the two parameters are polynomial functions of the month and time of day. Estimates of the amount of error to be expected when using the models are given. (Author)

AD-A075 524/9 PC **A03**/MF **A01**
Naval Environmental Prediction Research Facility Monterey Ca
Monthly Climatology for Evaporation Duct Occurrence in the North Atlantic Ocean.
Final rept.,
Wayne Sweet. Jun 79, 40p Rept no. NEPRF-TR-79-01

Evaporation duct climatologies are given for 10 North Atlantic Ocean weather stations. Statistics for evaporation duct height, a measure of duct intensity, are presented in the forms of frequencies of occurrence for each month and histograms of percentages of occurrence for mid-months of each of the four seasons. These data can be used both for operational planning and as input to war gaming. (Author)

HCO/T1041-01 PC **A11**/MF **A01**
National Climatic Center, Asheville, NC.
National Wind Data Index. Final Report.
M. J. Changery. Dec 78, 231p
Contract EX-76-A-29-1041

The index is intended as a guide to the identification of all locations in the United States with original wind data in any form that have been archived at the National Climatic Center. Data in the NCC archives have been recorded by the National Weather Service and its predecessor agencies, the US military services including the Coast Guard, the Federal Aviation Administration, and other weather reporting facilities. Wind summaries have been produced for many locations for various periods of record. Those available through the Center have been documented in a previous publication. For most locations, however, the data remains as unsummarized manuscript and/or autographic records. A significant portion of the data has been observed at stations where no data have been recorded during the past 20 to 30 years. (ERA citation 04:051408)

HCP/T4016-01/2 PC **E10**/MF **A01**
Northrop Services, Inc., Huntsville, AL.
Solar-Climatic Statistical Study.
R. E. Bray. Feb 79, 570p
Contract EG-77-C-01-4016

The Solar-Climatic Statistical Study was performed to provide statistical information on the expected future availability of solar and wind power at various nationwide sites. Historic data (SOLMET), at 26 National Weather Service stations reporting hourly solar insolation and collateral meteorological information, were interrogated to provide an estimate of future trends. Solar data are global radiation incident on a horizontal surface, and wind data represent wind power normal to the air flow. Selected insolation and wind power conditions were investigated for their occurrence and persistence, for defined periods of time, on a monthly basis. Information of this nature are intended as an aid to preliminary planning activities for the design and operation of solar and wind energy utilization and conversion systems. Presented in this volume are probability estimates of solar insolation and wind power, alone and in combination, occurring and persisting at or above specified thresholds, for up to one week, for each of the 26 SOLMET stations. Diurnal variations of wind power were also considered. Selected probability data for each station are presented graphically, and comprehensive plots for all stations are provided on a set of microfiche included in a folder in the back of this volume. (ERA citation 04:051214)

N79-32790/4 PC **A03**/MF **A01**
Stockholm Univ. (Sweden). Dept. of Meteorology.
A Bulk Model of the Atmospheric Planetary Boundary Layer.
M. S. Smeda. 2 May 79, 33p DM-28
Subm-Prepared in Cooperation with Intern. Meteorol. Inst., Stockholm.

The integrated momentum and thermodynamic equations for the planetary boundary layer (PBL) are solved numerically to predict the mean changes of wind and potential temperature from which surface fluxes are computed using bulk transfer coefficients of momentum and heat. The formulation and testing of a PBL height model based on the turbulent energy budget equation where turbulent fluxes of wind and heat are considered as the source of energy is described. The model exhibits the capability to predict the PBL height development for both stable and unstable regimes of observed conditions. Results of the model agree favorably with Deardorff's (1974) and Tennekes' (1973) models in convective conditions.

N79-32796/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
The Wave Structures of the Eady Model of Baroclinic Instability.
J. M. Hyun, and W. W. Fowlis. Oct 79, 26p
NASA-TP-1548

By solving the linear quasi-geostrophic set of equations pertinent to the Eady model, the complex eigenvalues and the eigenfunctions are obtained. The propagation speed and the growth rate are computed. Quantitative information is provided about the wave structures for several unstable models, a marginally stable mode, and a stable mode. The peculiarities concerning the amplitude and the phase variations of the waves are noted as the wavenumber varies from the unstable region to the stable region. Physical interpretations of the interrelationships among the dynamical variables are given, with a view toward revealing important aspects of the energy transfer from the basic state to the growing waves.

N79-32813/4 PC **A10**/MF **A01**
Danish Meteorological Inst., Copenhagen.
Summaries of Weather Observatories at Weather Stations in Greenland from 1966 to 1970.
1978, 216p ISBN-87-7478-156-1

Meteorological statistics covering the period 1966 to 1970 were working out using electronic data processing of synoptic surface observations made at 26 weather stations in Greenland. The stations geographical positions and hours of observations are given. The statistics are presented as tables which comprise data on wind speed and direction as well as frequency of surface wind. Data on visibility ranges, cloud ceilings, and the number of occurances of fog, precipitation, blowing snow, and thunderstorms are also shown. The number of occurances of specified values of surface temperatures, specified values of surface minimum and maximum temperatures as well as data on average mean sea level are also tabulated.

N79-33681/4 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Numerical Simulation of the Local Properties of the Atmosphere Simulacao Numerica de Propriedades Locais DA Atmosfera.
R. N. Depaiva. Jul 79, 9p INPE-1510-RPE/059
In Portugese; English Summary.

A description of the subroutine ATDENS is presented which, using a numerical procedure, gives approximate values for the density, mean molecular weight, and local temperature of the atmosphere. The subroutine ATDENS is the coding of Roberts' analytical procedure based upon Jacchia's atmospheric model (including Jacchia's modifications). The use of the subroutine gives the elements needed for the computation of the drag coefficient and drag accelerations.

N79-33720/0 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Some Studies on Moisture Conditions in the Southern Hemisphere.
Y. Viswanadham, N. J. M. Rao, and G. S. S. Nunes. Jul 79, 32p INPE-1507-RPE/047

Vertical cross sections of the seasonal mean atmospheric humidity conditions on a planetary scale for the Southern Hemisphere are presented. The fields of mean precipitable water content are analysed for the four seasons of the year. Zonally averaged values of the various quantities at several levels are presented and compared, wherever possible, with previous results. The structure of these fields in association with general circulation patterns of the atmosphere is discussed. Precipitation efficiencies for the three continents, South America, Africa and Australia are estimated. Vertical cross sections of atmospheric cooling rates for January and July are presented.

N79-33721/8 PC **A06**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A Climatological and Synoptic Study Using Radiosonde Data of Manaus and Belem (1968-1976) Um Estudo Climatologico E Sinotico Utilizando Dados de Radiossondagem de Manus E Belem (1968-1976).
Master's Thesis.
M. T. Kagano. Aug 79, 111p INPE-1559-TDL/013
Misc-Revised.
In Portugese; English Summary.

At low levels, at Belem, changes of wind direction are noted, which are probably due to the effects of local wind systems. The climatological mean of precipitable water at 12 GMT is greater at Manaus than at Belem. However, the monthly means show that this is not always the case. The precipitable water at 00 GMT at Belem is greater than the 12 GMT values at both stations. The study of short-term variations revealed: (1) oscillations in the wind direction, at low levels for both stations, with a period of 3 to 5 days; (2) the relative humidity reaches a maximum immediately after the passage of the maximum cyclonic curvature (trough) in the wind field; and (3) the calculated eddy transports of humidity are u'q'0 and v'q'0. These features are in agreement with those determined in observational and theoretical studies of easterly waves.

N79-33722/6 PC **A06**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
Summary of the NASA/MSFC FY-79 Severe Storm and Local Weather Research Review.
Sep 79, 92p NASA-CP-2105
Conf-Presented at the NASA/Msfc FY-79 Severe Storm and Local Weather Res. Rev., Huntsville, Ala. 12-13 Sep. 1979.

Significant acomplishments, current focus of work, plans for FY-80, and recommendations for new research are outlined for 36 research projects proposed for technical monitoring by the Atmospheric Sciences Division at Marshall Space Flight Center. Topics of the investigations, which were reviewed at a two-day meeting, relate to cloud physics, atmospheric electricity, and mesoscale/storm dynamics.

N79-33725/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

Results of a Statistical Approach to Rainfall Estimation Using Nimbus 5 6.7 Micrometers and 11.5 Micrometers Thir Data.
J. P. Ormsby. Jul 79, 25p NASA-TM-80296

Nimbus 5 6.7 mm and 11.5 mm temperature humidity infrared radiometer (THIR) data were used in a simple multiple regression scheme to test the feasibility of using these data to estimate hourly rainfall. Throughout the test area (85 W to 105 W and 45 N to 30 N) subareas (8 deg x 6 deg) were chosen from which point to point and areal statistics were obtained. Four subsets of data were used. The first consisted of only those surface stations indicating precipitation whose latitude and longitude coincided with the THIR grid points. A second used surface stations 0.1 degree from the THIR grid points. The third was a combination of subsets one and two. A reciprocal distance weighting scheme was used to derive precipitation values in data sparse areas. A fourth subset was made using these data combined with the data from subsets one and two. Point estimates resulted in negative correlations between estimated and grid derived surface precipitation. One degree areal estimates showed a slight improvement with a correlation coefficient of approximately 0.11. Single regression areal estimates resulted in correlations of approximately 0.11 and 0.20 for the 6.7 mm and 11.5 mm data respectively. These poor results were attributed to problems which are inherent in the satellite data (location errors, short temporal span of data, wavelength of sensors, etc.) and the lack of sufficient surface data to better verify the satellite estimate.

PB80-105547 PC **A13/MF A01**
Texas Dept. of Water Resources, Austin.
Texas HIPLEX, 1978. Field Operations Summary.
Technical rept.,
Robert F. Riggio, and William O. Alexander. Oct 78, 286p TDWR/LP-73
Contract DI-14-06-D-7587

This report provides an overview of each Texas HIPLEX day's weather events as observed from the ground and the air. Weather and flight observations taken during the 1978 Texas HIPLEX field season are presented in chronological order beginning on June 1, 1978 and ending on July 31, 1978. Weather summaries and observations are presented for each day during the field season. Aircraft observations and debriefing notes are included only for the days the aircraft flew, whether on a seeding mission or a sampling mission.

PB80-105984 PC **A03/MF A01**
Texas A and M Univ., College Station. Dept. of Meteorology.
Aircraft Operations in the 1979 Texas HIPLEX Field Program.
Interim technical rept.,
Alexis B. Long. Aug 79, 36p
Contract DI-14-06-D-7587
Sponsored in part by Texas Dept. of Water Resources, Austin.

All significant aircraft operations in the 1979 Texas HIPLEX field program are described in detail. Included are all nine of the HIPLEX missions in which microphysical data were obtained on natural and seeded clouds. Also included are missions aimed at mapping mesoscale temperature, moisture, and velocity fields in and around convective systems. Tower fly-bys and intercomparison flights are included. The first part of the report describes some of the aircraft instrumentation problems and the format of the data collected. The bulk of the report then descries each aircraft mission, in enough detail for others to judge whether to study it in depth. Emphasis is placed on cloud observations. Summary tables are included of all missions and of the cloud physics missions.

PB80-111396 PC **A03/MF A01**
National Oceanic and Atmospheric Administration, Silver Spring, MD. Air Resources Labs.
A Summary of Recent Atmospheric Diffusion Experiments.
Technical memo.,
Roland Draxler. Apr 79, 39p NOAA/TM/ERL/ARL-78, NOAA-78092603

Most diffusion experiments conducted in recent years were performed in areas with complex topography or meteorology: near shoreline environments, over rough and complex terrain, above and within forest canopies, and over urban areas. Other experiments were designed to investigate dispersion under low wind speed conditions, or transport and dispersion over long distances. The experimental results in each category are discussed and the dispersion data are illustrated in a summary diagram. When possible, the dispersion data are compared to calculated values from predictive methods developed for homogeneous terrain or to methods developed by the experiment authors.

PB80-112782 PC **A02/MF A01**
National Environmental Satellite Service, Washington, DC.
Satellite Activities of NOAA 1978.
Jun 79, 23p NOAA-79100504

The National Oceanic and Atmospheric Administration (NOAA) operates, manages, and improves the Nation's operational environmental satellite systems; provides satellite data to assess the impact of natural factors and human activities on global food and fuel supplies and on environmental quality; uses satellite data and aerial photography for charting, coastal mapping, and geodetic research; employs satellite data to improve the assessment and conservation of marine life; and improves weather services by automating forecast and observation stations, by installing better radar systems, and by continued atmospheric research. The National Environmental Satellite Service of NOAA operates two satellite systems: The polar-orbiting system and the geostationary system. The NOAA elements that participate in these programs are listed with a description of their individual programs.

PB80-112873 PC **A04/MF A01**
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
An Ocean Climate Research Plan,
J. O. Fletcher. Aug 79, 58p NOAA-79092106
Color illustrations reproduced in black and white.

This document contains the rationale and a recommended plan for a research program on the oceanic processes that underlie the dynamics of the global climate and its variability. The goal of the program is to identify and clarify the processes responsible for year-to-year climate change, and to apply the resultant understanding to the development of conceptual and numerical models for use in the simulation and prediction of climate.

PB80-112949 PC **A02**
National Environmental Satellite Service, Washington, DC.
The Satellite-Derived Northern Hemisphere Snowcover Record for the Winter of 1977-78,
Donald R. Wiesnet, and Michael Matson. Jul 79, 8p NOAA-79100512
Pub. in Monthly Weather Review, v107 n7 p928-933 Jul 79.

NOAA satellite-derived snowcover data for the winter of 1977-78 are presented. Comparison with the 12-year satellite snowcover record shows: (1) a record-high North American winter snowcover, exceeding the expected variability; (2) a record-high Eurasian winter snowcover, within the expected variability; and (3) a record-high Northern Hemisphere winter snowcover, exceeding the expected variability. The satellite data provides timely monitoring of continental snowcover, which may in turn serve as an index of winter severity and climatic fluctuation.

PB80-801046 PC **N01/MF N01**
National Technical Information Service, Springfield, VA.
Fog Dispersal (A Bibliography with Abstracts).
Rept. for 1964-Oct 79,
Robena J. Brown. Nov 79, 238p
Supersedes NTIS/PS-78/1123, NTIS/PS-77/1024, NTIS/PS-76/0835, NTIS/PS-75/750, and NTIS/PS-75/099.

Studies concerned with fog dispersal techniques are cited, primarily concentrating on dispersal at airports. The physics and chemistry of fog dispersal, dispersing chemicals, the use of helicopter downwash to remove fog, and electrical dispersing methods are included. (This updated bibliography contains 230 abstracts, 8 of which are new entries to the previous edition.)

UCRL-52680 PC **A03/MF A01**
California Univ., Livermore. Lawrence Livermore Lab.
Regional Wind-Field Study in Complex Terrain During Summer Sea-Breeze Conditions.
W. M. Porch, P. A. Volker, K. R. Peterson, R. L. Weichel, and C. Sherman. 5 Mar 79, 28p
Contract W-7405-ENG-48

A regional-scale data base, consisting of wind and temperature data for June and July of 1977, was developed for the greater San Francisco Bay Area and eastward to the Central Valley. Continuous meteorological measurements were made in the area of a windy pass (Patterson Pass) 3 km east of Lawrence Livermore Laboratory. This area was chosen because of its complex terrain and importance as a downwind topographic feature affecting the dispersal of possible accidental atmospheric releases from the Laboratory and as an area of high wind-energy potential. The results of this study provided the following: (1) a data base, including over 50 stations for use in numerical wind-field regional-scale-model validation; (2) characterization of summer sea breese oscillations of approx. 6 and 12 days (this analysis is useful in calculating wind-power persistence and in understanding summer sea-breeze mechanisms in the Bay Area); and (3) successful application of an optical space-averaging wind sensor over a 1-km path across a pass to provide long-path averaged data more suitable for regional, numerical wind-field models with kilometre-size grid elements. (ERA citation 04:052136)

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

AD-A075 164/4 PC **A03/MF A01**
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
A Cost Operator Approach to Multistage Location-Allocation.
Technical rept.,
Robert V. Nagelhout , and Gerald L. Thompson. Jul 79, 37p Rept nos. MSSR-440, WP-16-79-80
Contract N00014-75-C-0621

The multistage factory-warehouse location-allocation problem is to decide on locations of warehouses and shipping amounts from the factories through the warehouses to meet customer demands in such a way that the total fixed plus variable costs are minimized. Capacity constraints at factories and warehouses are also imposed. We present a cost operator algorithm for solving this problem. The algorithm takes into account the network structure and the submodularity of the objective function. Computational results with problems taken from the literature as well as new problems are provided. (Author)

AD-A075 221/2 PC **A04/MF A01**
Carnegie-Mellon Univ Pittsburgh PA Graduate School of Industrial Administration
Institutionalization of Planned Organizational Change.
Interim rept. 1 May 79-30 Apr 80,
Paul S. Goodman, Max Bazerman, and Edward Conlon. Aug 79, 65p Rept no. 1
Contract N00014-79-C-0167
Prepared in cooperation with Georgia Inst. of Tech. Atlanta. Coll. of Industrial Management.

The concept of institutionalization, which concerns the process by which organizational change is sustained, is examined. Basic definitional attributes and a two-phase model of institutionalization are presented. Then factors in the literature which affect the degree of institutionalization are reviewed and related to the model. Some of the factors include: the organization's reward system, transmission mechanisms, group forces, diffusion processes, etc. (Author)

AD-A075 224/6 PC **A02/MF A01**
Center for Naval Analyses Alexandria VA Inst of Naval Studies
Discounting and Fiscal Constraints: Why Discounting Is Always Right.
Professional paper,
R. Thaler. Aug 79, 18p Rept no. CNA-PP-257

In a recent article Rolf Clark says, 'Instead of wondering whether defense managers should discount future costs, one should ask, 'Are defense managers fiscally constrained.' He concludes that under the existing institutional arrangements defense managers should not discount. In this paper the author argues that, even under the existing institutional arrangements, they most certainly should discount.

AD-A075 345/9 PC **A03/MF A01**
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
A Cost Operator Approach to Multistage Location-Allocation.
Management Sciences research rept.,
Robert V. Nagelhout , and Gerald L. Thompson. Jul 79, 37p Rept nos. MSRR-440, WP-16-79-80 Contract N00014-75-C-0621

The multistage factory-warehouse location-allocation problem is to decide on locations of warehouses to meet customer demands in such a way that the total fixed plus variable costs are minimized. Capacity constraints at factories and warehouses are also imposed. We present a cost operator algorithm for solving this problem. The algorithm takes into account the network structure and the submodularity of the objective function. Computational results with problems taken from the literature as well as new problems are provided. (Author)

AD-A075 387/1 Not available NTIS
Hughes Aircraft Co Culver City CA
R and D Productivity. Second Edition.
Study rept.
Jun 78, 191p
Availability: Hughes Aircraft Co., Culver City, CA 90230 (No copies furnished by DTIC).

Contents: Productivity Improvement Considerations; Improving Operational Productivity; Improving Managerial Productivity; Improving Employee Productivity; and Productivity Profiles.

AD-A075 397/0 MF **A01**
Office of the Secretary of Defense Washington DC Historical Office
The Department of Defense, Documents on Establishment and Organization 1944-1978,
Alice C. Cole, Alfred Goldberg, Samuel A. Tucker, and Rudolph A. Winnacker. 1979, 362p
Availability: Superintendent of Documents, GPO, Washington, DC 20402 HC$11.00. Microfiche furnished to DTIC (and NTIS) users.

This volume, the first of a series, is a collection of documents with a single theme-the establishment and development of the organization of the Department of Defense. This reference collection contains source materials that will be useful to scholars, officials of government, reporters of current affairs, and others. It may also afford insights into the evolution of a large and complex department of government. Topics summarized and/or documented include: The National Security Act of 1947; The Amendment of 1949; Reorganization Plan No. 6 of 1953; Defense Reorganization Act of 1958; Administrative and Legislative Modifications -- 1958-1978; and Functions of the Armed Services and the Joint Chiefs of Staff.

AD-A075 488/7 PC **A05/MF A01**
Naval Postgraduate School Monterey CA
An Analysis of the Relationship of Coast Guard Zero Base Budgeting and Planning, Programming and Budgeting.
Master's thesis,
Charles L. Miller, III. Sep 79, 100p

The purpose of this study is to examine zero base budgeting and its affect on the Coast Guard. This study is divided into four chapters. Chapter One presents the theory and process of zero base budgeting. Chapter Two presents a summary of current Coast Guard planning, programming and budgeting process and the Coast Guard accounting system. Chapter Three presents a comparison of zero base budgeting and the Coast Guard planning, programming and budgeting. The strengths, weaknesses and support requirements of the two processes are discussed. Chapter Four presents four recommendations for the improvement of the Coast Guard planning, programming and budgeting process and accounting system to facilitate the use of zero base budgeting. The four recommendations concern reports; surrogate measures; standards; and reorganization of the Coast Guard planning, programming and budgeting process. Each recommendation contains a cost/benefit analysis and a discussion of the basic actions needed to implement the recommendations. (Author)

AD-A075 529/8 PC **A05/MF A01**
Naval Postgraduate School Monterey Ca
The Impact of Alternative Maintenance Philosophies upon Inventroy Management.
Master's thesis,
Rene A. Smith. May 78, 92p

The U.S. Navy is planning to enter the 21st Century with a large new class of surface combatments which areto be maintained in a manner significantly different from previous procedures. This thesis, through the use of a simulator, will investigate the possible impact of those new maintenance procedures upon aggregate inventory levels. The relevant inventory aspects considered are average inventory level, completion activity and crisis response. (Author)

AD-A075 581/9 PC **A05/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
The Organizational Impact of the Implementation of a New Quality Assurance Method in the Base Contracting Environment.
Master's thesis,
John W. Hargrave. 7 Sep 79, 79p Rept no. AFIT-LSSR-24-79B

This study examined the potential impact of proposed AFR 400-28, Base Level Service Contracts, and revised AFR 70-9, Contract Quality Assurance Evaluation, on a base contract administration activity. The specific services contracting areas examined included the functions, skills, skill mix and organizational structure of the base contract administration activity. The key functions impacted by the regulations include the approval and implementation of quality assurance and control procedures along with the training of the affected personnel. To effectively accomplish these key functions, new skills may be required, and organizational specialization may be appropriate in the larger base contract administration activities. The study adapted a methodology developed by Peter Drucker and considered the constraints of job enrichment in designing an organizational model for a large base contracting administration activity. The model developed proposed specialization within contract administration and the conceptualization and specialization of the quality assurance function within the contract administration activity.

AD-A075 582/7 PC **A06/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
Development of Improved Criteria for Determining the Need for Pricing Staff Action.
Master's thesis,
Margaret A. Martinez, and Thomas J. McConnell. 7 Sep 79, 106p Rept no. AFIT-LSSR-1-79B

The objective of this research was to determine whether improvement could be made in the current method of determining the need for pricing staff action. Currently, a dollar threshold is the sole criterion used in Air Force contracting and pricing offices to determine whether the price or cost analysis of a contractor's proposal should be performed by the pricing office or by the contracting office. While this sole criterion is convenient and easy to apply, it was not considered to be an effective decision rule. Interviews conducted with pricing experts in both Air Force Systems Command and Air Force Logistics Command revealed that the dollar threshold did not, in most cases, identify those contracts requiring the special expertise of the pricing offices. The research indicated that the use of a decision rule which considered the factors of type of contract, nature of buy, contracting officer skill, complexity, and contractor, in addition to dollar value would result in a more effective use of pricing resources. (Author)

AD-A075 587/6 PC **A06/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
Cooperative Logistics Supply Support Arrangement Pricing Relationships Between Programmed and Nonprogrammed Requisitions.
Master's thesis,
John A. Breed, and James S. Winn. 7 Sep 79, 106p Rept no. AFIT-LSSR-8-79B

The United States Government participates with friendly countries in Foreign Military Sales (FMS) arrangements to enhance its objectives of peace and security. The Department of Defense usually will complete FMS contracts only after insuring that the foreign customer has adequately considered logistical support for the weapon systems sold. Supply Support Arrangements (SSA) are negotiated to provide this follow-on logistical support to countries who invest and participate in the U.S. defense logistics system. Under this arrangement, foreign governemnts are required to put up advance equity funds equal to a stated portion of the inventory items to be purchased for their needs. This causes items in the SSA to become programmed for foreign customers and should result in lower prices based on advanced procurement, shipments by the Item Manager below the control level, and exclusion of replacement pricing for programmed requisitions. The purpose of this thesis was to determine if a significant difference exists in final billing prices for programmed versus nonprogrammed Cooperative Logistics Supply Support Arrangement (CLSSA) requisitions and if prescribed pricing procedures were being implemented effectively. (Author)

AD-A075 588/4 PC **A06/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
A Statistical Analysis to Determine the Supply Effectiveness of the Cooperative Logistics Supply Support Arrangement (CLSSA) Program.
Master's thesis,
James R. Callahan, Charles E. Johnson, and Mahmood M. Moradmand. 7 Sep 79, 117p Rept no. AFIT-LSSR-3-79B

This thesis provides an explanation of the supply aspects of the Cooperative Logistics Supply Support Arrangement (CLSSA). A statistical and operational analysis is made of the fill times for programmed and nonprogrammed requisitions and requisitions containing Not Mission Capable-Supply (NMCS) indicators. Select data obtained from the HO51 computer data files forms a basis for the analysis. The analysis indicates that the mean fill times for programmed requisitions are statistically less than fill times for comparable nonprogrammed requisitions. Further, NMCS requisitions were found to receive no better support if coded as programmed. The thesis concludes that the differences in fill times for programmed and nonprogrammed requisitions, while statistically significant, fails to meet established criteria. (Author)

DOE/ERA-0052/1(Rev.) PC **A05/MF A01**
Department of Energy, Washington, DC. Economic Regulatory Administration.
ROSTER: Emergency Electric Power Administration. Appendix 3.
Aug 79, 76p

The Emergency Electric Power Administration national headquarters personnel; area map; directors, deputies, and regional power liason representatives; state power liaison representatives; major utility representatives are given. A map of the Federal Emergency Management Administration is given and directors of the regional offices are listed. (ERA citation 04:050218)

N74-75287/4 PC **A02/MF A01**
George Washington Univ., Washington, DC. Program of Policy Studies in Science and Technology.

Emerging Trends in Technology Assessment.
Vary T. Coates. Apr 74, 25p GWPS/MON-19
Grant NGL-09-010-030
Presented at the Annual Meeting of the American Association for the Advancement of Science held at San Francisco, CA., on February 18, 1974.

The paper reviews recent and emerging trends and problems in technology assessment. It describes the organization and current activities of the Congressional Office of Technology Assessment and stresses its critical importance to future development of technology assessment, especially the extent to which it is able to resist inevitable political pressures. Technology assessment as a required activity in government planning may benefit from the energy shortage and other impending crises which underline the importance of anticipatory problem identification.

PB80-100555 PC **A05**/MF **A01**
American Univ., Washington, DC. Inst. for Applied Public Financial Management.
Use of Financial Information by Legislative Decisionmakers-Some Insights.
Final rept.,
John H. Stahl. 31 Jul 78, 83p AU/IAPFM-37-77-3
Sponsored in part by General Accounting Office, Falls Church, VA. Washington Regional Office.

The report discusses the evolution of government corporations and federal legislation that establishes congressional oversight of these institutions. Also provided are a history of GAO's implementation of government corporation audits since 1945 and some insights into congressional perceptions and agency perceptions of the audits.

PB80-102163 PC **A03**/MF **A01**
Federal Highway Administration, Washington, DC. Program Management Div.
An Overview of Scheduling and Monitoring for the Manager.
Final rept.,
Ivano E. Corvi, Edward Kashuba, and Joseph Deigh. 1978, 30p FHWA/PL-79/018

The scheduling and monitoring of highway and other transportation projects are necessary if transportation managers are to use their agency's resources effectively. The report provides the transportation agency manager with a general idea of how scheduling and monitoring can increase agency effectiveness. Project scheduling and monitoring procedures used by the States of Florida, Iowa, and Utah are described. Specific techniques discussed include the Program Review and Evaluation Technique (PERT), the Critical Path Method (CPM), and the Work Progress Diagram (WPD).

PB80-105364 PC **A03**/MF **A01**
Minnesota Tax Study Commission, St. Paul.
Report of Findings and Recommendations for Simplification of the Minnesota Income Tax.
Jan 79, 29p

The report discusses various changes to the current income tax system in Minnesota that could greatly simplify the tax. Some of the recommendations involve simplification of the income tax return forms and instructions.

PB80-105463 PC **A18**/MF **A01**
Harvard Univ., Boston, MA. Graduate School of Business Administration.
Proceedings of the Workshops on Technological Change in the U. S. Automobile Industry, October 1977 Through April 1978, and the Symposium on Technology, Government and the Automotive Future, October 19-20, 1978.
Final rept. Oct 77-Apr 79,
William J. Abernathy, and Douglas H. Ginsburg.
Jul 79, 409p DOT/TSC/NHTSA-79/33, DOT-HS-804 786
Contract DOT-TSC-1384

The purpose of the meetings was to explore the implications of technological change in the U.S. automotive industry in support of improved policy formulation to meet emerging national needs. Five workshops were conducted in the following areas: (1) Motor Vehicle Regulatory Process, (2) Consumer as a Factor in Motor Vehicle Innovation, (3) the Supply Industry as a Factor in Motor Vehicle Innovation, (4) Changing Incentives for Motor Vehicle Research and Development, and (5) Role of National and Multinational Corporations in Motor Vehicle Innovation. The five key issues emanating from these workshops were the federal R&D policy in the motor vehicle sector, product rating information for consumers, regulatory decision-making, regulation and international trade, and transportation policy.

PB80-105638 PC **A05**/MF **A01**
General Accounting Office, Washington, DC. Financial and General Management Studies Div.
Contracting for Computer Software Development--Serious Problems Require Management Attention to Avoid Wasting Additional Millions.
Report to the Congress.
9 Nov 79, 95p FGMSD-80-4

Federal agencies often hire contractors to develop computer programs and associated documents. Many development contracts are successful, but some result in unsatisfactory or useless software. Several causes of problems were common to all contracts GAO reviewed that encountered difficulties. This report recommends that the National Bureau of Standards and the General Services Administration issue specific guidelines to assist Federal agencies in recognizing and dealing with the unique problems of contracting for software development.

PB80-105899 PC **A02**/MF **A01**
Minnesota Tax Study Commission, St. Paul.
Minnesota Rankings, Comparison of Taxes and Expenditures, 1977.
Dec 78, 24p

The report ranks Minnesota's taxes and expenditures with the remaining states. Types of taxes compared are state individual income tax, property tax, state general sales tax and corporation income tax. Expenditures for education, highways, Welfare, Health, Fire, police and recreation are compared.

PB80-106339 PC **A06**/MF **A01**
International Energy Associates Ltd., Washington, DC.
Developing Science and Technology Resources for the Governor of the State of South Carolina. Part I: Developing a Science, Engineering, and Technology Policy Guidance Mechanism for the Governor of the State of South Carolina. Part II: The South Carolina Energy Research Institute,
John W. Simpson, Blythe M. Jones, and Ben Hong. Sep 78, 123p NSF/RA-780660
Grant NSF-ISP77-25869
Sponsored in part by South Carolina Office of Community Development, Columbia.

Potential mechanisms are examined which would enable the Governor of South Carolina to identify, obtain, and use in the most beneficial way the state's science, engineering, and technology resources in formulating public policy. The study identifies past attempts in South Carolina to develop such mechanisms, surveys past and present mechanisms in other states, analyzes the policy-making process in South Carolina, and outlines implementation procedures for some of the candidate mechanisms. One specific candidate mechanism, the South Carolina Energy Research Institute, is examined in detail.

PB80-106446 PC **A10**/MF **A01**
Center for Governmental Research, Inc., Rochester, NY.
The General Revenue Sharing Formula, Distributional and Equalization Effects of the General Revenue Sharing Formula and General Revenue Sharing Formula Alternatives.
Working paper,
Jeffrey O. Smith, and Friedrich J. Grasberger.
Jun 79, 206p WP-2, NSF/RA-790139
Grant NSF-APR77-15726
See also report dated 15 Jun 75, PB-243 657.Color illustrations reproduced in black and white.

The paper presents an analysis of the distributional and equalization effects of the present and alternative formulas for the determination of entitlements for the General Revenue Sharing program. It contains a synoptic review of background information focusing on the existing GRS formulas, a brief discussion of major formula issues, a description of the frameworks utilized in the analysis of present and alternative formulas, and several series of tables and maps depicting the effects of various formula modifications.

PB80-111925 PC **A03**/MF **A01**
General Accounting Office, Washington, DC. Financial and General Management Studies Div.
Better Cash Management Can Reduce the Cost of the National Direct Student Loan Program.
Report to the Congress.
27 Nov 79, 33p FGMSD-80/5

The report summarizes the results of a review on the cash management of the National Direct Student Loan program. It shows that schools maintain large amounts of Federal funds beyond their current program needs--those funds should be returned to the Government. However, to avoid serious impairment of program operations, the Congress may have to provide the Department of Health, Education, and Welfare with the necessary flexibility to reuse returned funds.

PB80-112642 PC **A07**/MF **A01**
National Science Foundation, Washington, DC. Universities and Nonprofit Institutions Studies Group.
Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1977. Technical Notes and Detailed Statistical Tables.
Annual rept.
Jun 79, 139p NSF-79/311
See also report dated Feb 78, PB-280 294.

The publication presents detailed statistics reported by 14 Federal agencies in the Survey of Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1977. It includes separate data for institutions of higher education, nonprofit institutions, and for academic and nonprofit-administered federally funded research and development centers. Detailed data are presented by type of activity, agency source of funding, geographic distribution, highest level of degree granted, and institutional control. For academic institutions, obligations for research and development and for fellowships, traineeships, and training grants are analyzed in terms of field of science.

PB80-113178 PC **A06**/MF **A01**
General Accounting Office, Washington, DC. Procurement and Systems Acquisition Div.
Federal R and D Laboratories - Directors' Perspectives on Management.
Report to the Congress.
28 Nov 79, 117p PSAD-80/8

The report, based on a survey of 192 laboratory directors in eight Federal agencies, provides statistics on the funding, personnel, and scope of activities of Federal laboratories. Although the survey was not conducted to assess laboratory productivity or evaluate operational effectiveness, the results highlight many issues that clarify the role and improve the effectiveness of the Federal laboratories in filling the Nation's research and development needs. The report is presented in three parts: (1) the executive summary which summarizes and highlights the major observations and conclusions, (2) the questionnaire results which include summary data for the laboratories surveyed, and (3) the appendixes which provide a listing of all laboratories covered in the survey, the questionnaire used, and tables comparing our summary statistics with various National Science Foundation statistics.

5B. Documentation and Information Technology

AD-A075 097/6 PC **A04**/MF **A01**
Office of Naval Research London (England)
European Scientific Notes. Volume 33. Number 7,
I. Kaufman , and Victoria S. Hewitson. 31 Jul 79, 54p Rept no. ESN-33-7

This monthly publication presents brief articles concerning recent developments in European sci-

entific research. It is hoped that these articles (which do not constitute part of the scientific literature) may prove of value to American scientists by calling attention to current developments and to institutions and individuals engaged in these scientific efforts. The articles are written primarily by members of the staff of ONRL. Topics in this issue include: La Renaissance du Dirigeable - A solution in search of a problem; Chemistry at Swiss Universities; Formal Design Methodology - How to design computer systems without really using your head; UK Battery Research -- Air Force; Solar Energy in Greece and Egypt; Fluid Dynamics at the Technische Hogeschool Delft; The Institut fuer Hydromechanik at the University of Karlsruhe; Materials Research at Leicester, Loughborough, and Leeds; High Strength Low Alloy Steels; Preoperative Hypothermic Renal Perfusion -- Another use for the arterial catheter; and Semiconductor Injection Lasers.

AD-A075 132/1 PC **A03**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
International Access to Aerospace Information.
Conference preprint.
Oct 79, 49p Rept no. AGARD-CPP-279

One of the main elements of the work of the AGARD Technical Information Panel (TIP) is to assist NATO's aerospace research and development activities by improving the effectiveness of scientific and technical information systems which exist in aerospace and defense fields in the various member nations of the Alliance. The choice of theme for this 1979 Specialists' Meeting stems from consideration of this aspect of TIP's work, particularly in relation to the host country, Greece. This document contains(preprints) of eleven papers to be delivered at the conference. Topics of the four sessions are Official Access Facilities for Aerospace Information; Requirements and Tools for International Cooperation and Data Exchange; Problems of Utilization of Aerospace Literature; and Non-literature Data in Aerospace and Development.

AD-A075 227/9 PC **A05**/MF **A01**
Battelle Columbus Labs Durham NC
A Survey of the State-of-the-Field of Requirements Methodology.
Final rept.,
Donald B. DeVorkin, and Richard T. Oberndorf. 6 May 79, 100p
Contract DAAG29-76-D-0100
Prepared in cooperation with Advanced Technology, Inc., San Diego, CA.

Based on a general awareness of the effects of inadequacies in requirements definition throughout the life cycle of a system, AIRMICS has initiated a comprehensive program for application of the latest methodologies in requirements analysis to the Army's information system development programs. This study is intended to provide a survey of the state-of-the-field of requirements methodology; that is, any of the component capabilities of requirements definition support such as methods, languages, and tools. The authors have endeavored, to the extent possible, to cite those organizations with relevant activities in requirements methodologies as developers, evaluators and users. The field is not mature and it is difficult to establish a set of desirable criteria for judging candidate methodologies. As an alternative, a small set of major factors is defined and used to determine the basic applicability of each candidate methodology to the AIRMICS program.

AD-A075 237/8 PC **A03**/MF **A01**
Air Force Human Resources Lab Brooks AFB TX
Readability of Air Force Publications: A Criterion Referenced Evaluation.
Final rept.,
Lydia R. Hooke, Philip J. DeLeo, and Sharon L. Slaughter. Sep 79, 36p Rept no. AFHRL-TR-79-21

The major objective of this study was to investigate the readability of a sample of Air Force regulations which had been rewritten in accordance with a recent Air Force directive. Regulation writers are directed to match in their texts the target reading grade level (RGL) of the personnel who will use the regulations. The directive also specifies the method for estimating RGLs. In the first part of this study, the writer-estimated RGL for each regulation was rechecked by Air Force Human Resources Laboratory staff using FORCAST formula. It was found that four of the seven writers underestimated the RGL of their regulation by more than one grade level. None of the writers was able to produce a document with an RGL, as estimated by AFHRL, much below 11th grade, while the audience RGL of three of the seven fields was below 10th grade. The main portion of the study involved testing the comprehensibility of each regulation to its user audience by means of the CLOZE procedures. In this testing method, every fifth word of a passage taken from the regulation was deleted, and personnel were asked to fill in the blanks with their best estimates of the missing words. A criterion of a CLOZE score (40%) corresponding to a 75% score on a traditional comprehension test was set as the standard for adequate comprehension. Mean scores in three fields were clearly above criterion, and the score in one additional field was borderline. Using the term literacy gap to refer to a situation where a text is written at an RGL too high for its intended readers, it was found that in all cases when there was no such gap, comprehension was adequate. (Author)

AD-A075 242/8 PC **A07**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France)
Manual of Documentation Practices Applicable to Defence-Aerospace Scientific and Technical Information. Volume II. Section 4. Data Recording and Storage. 5. Mechanization Systems and Operations. 6. Announcement Services and Publications,
S. C. Schuler. Jul 79, 128p Rept no. AGARD-AG-235-VOL-2
See also Volume 1, AD-A060 478.

This is the second of four separately published volumes describing basic documentation practices involved in the initial setting up and operation of an Information-Library organization to provide defence-aerospace information services. The focus is on a practical, rather than theoretical, approach for both the senior person setting up a new system as well as junior staff who may be using the manual as a training aid. This volume consists of three main sections. The first two are concerned with basic mechanisation and the use of computers for information processing. An introduction to the hardware and software of computer systems is given. Detailed aspects such as input of data, storage devices, output printers, system design and bureau working are discussed. Some guidelines on the processing of chemical structure input is included. The third section describes the organisation and methods of production involved in various announcement publications and services including SDI.

AD-A075 257/6 PC **A16**/MF **A01**
Naval Postgraduate School Monterey CA
A Summary of the Naval Postgraduate School Research Program.
Summary rept. 1 Oct 77-30 Sep 78.
30 Sep 78, 373p Rept no. NPS-012-79-003PR

This report contains two hundred and thirty-three summaries on research projects which were carried out under funding to the Naval Postgraduate School Research Program. This research was carried out in the areas of computer science, mathematics, administrative sciences, operations research, national security affairs, physics & chemistry, electrical engineering, meteorology, aeronautics, oceanography, mechanical engineering, etc.

AD-A075 355/8 PC **A06**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City Nj
Exhaust Emissions Characteristcs for a General Aviation Light-Aircraft Avco Lycoming TIO-540-J2BD Piston Engine.
Final rept.,
Eric E. Becker. Sep 79, 104p FAA-NA-79-36, FAA-RD-79-68

The Avco Lycoming TIO-540-J2BD engine (S/N890-X) was tested at the National Aviation Facilities Experimental Center (NAFEC) to develop a steady state exhaust emissions data base. This data base consists of current production baseline emissions characteristics, lean-out emissions data, effects of leaning-out the fuel schedule on cylinder head temperatures, and data showing ambient effects on exhaust emissions and cylinder head temperatures. The engine operating with its current full-rich production fuel schedule could not meet the proposed Environmental Protection Agency (EPA) standard for carbon monoxide (CO) and unburned hydrocarbons (HC) under sea level standard-day conditions. The engine did, however, meet the proposed EPA standards for oxides of nitrogen under the same sea level conditions. The results show a trend toward higher levels of emissions output for CO and HC when ambient conditions approximated hot day sea level conditions while producing slightly lower levels of NO(x). (Author)

AD-A075 417/6 PC **A08**/MF **A01**
Naval Postgraduate School Monterey CA
Recent Naval Postgraduate School Publications,
William M. Tolles, and Jack R. Borsting. Jul 79, 167p Rept no. NPS-012-79-004PR

This publication contains a listing for each faculty member from each department indicating the conference presentations, contributions to books, journal publications and conference proceedings, technical reports and notes. (Author)

AD-A075 572/8 MF **A01**
Arinc Research Corp Annapolis Md
Mechanization Architecture for Enhancement of Avionics Planning Data Base.
Final rept.,
S. Cotton , and R. Gilbertson. Sep 79, 167p Rept no. 1750-01-1-2024
Contract F33657-79-C-0567
Availability: Document partially illegible.

This report presents the design of an enhancement to the mechanized version of the Avionics Planning Baseline (APB). For each Air Force aircraft, the APB records the force structure (for a 15-year period), the avionics suite, all present and planned modifications to the avionics suite, all Class IV and Class V funding of those modifications, and all ROC/SON/GOR statements dealing with avionics requirements. (Author)

N79-33151/8 PC **A06**/MF **A01**
Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e. V., Karlsruhe (Germany, F.R.). Inst. fuer Systemtechnik und Innovationsforschung.
Published Patent Applications and Patents Resulting from German Government Sponsored Research and Development.
Final Report.
G. Jaeckel, and I. Zierl. Dec 78, 112p BMFT-FB-T-78-31
Contract BMFT-NT-0442
In German; English Summary.

The ministry for Research and Technology of the Federal Republic of Germany has sponsored research and development related to industrial innovations since 1969. Work reported on includes the published patent applications and patents from all projects which were sponsored up to and including 1974. Fields covered are electronics, optics, nonnuclear energy technology, applications of pure physics, materials development, and industrial processes technology.

PB80-105216 PC **A11**/MF **A01**
Moore School of Electrical Engineering, Philadelphia, PA.
System Requirements Analysis for the Chemical Structure and Nomenclature System (CSNS).
Final rept.,
David Lefkovitz, Helen N. Hill, and Carol S. Kulp. 28 Sep 79, 234p
Contract EQ8AC027

The Chemical Substances Information Network (CSIN) is a network of computer processors of chemical information, with two processors serving as central directories of the network: (1) a directory of data bases and the types of information contained in them and (2) a directory of chemical sub-

stances contained in or referenced by any of the network's data bases. A substance would be uniquely identified by its CAS Registry Number for systematic cross referencing. This substance identification processor is called the Chemical Structure and Nomenclature System (CSNS). It will enable CSIN users to determine whether a particular substance exists and which substances in some generic class exist in the network. The report presents a plan for CSNS development: functional and operational requirements, design alternatives, existing systems, and a developmental approach.

PB80-105901 PC **A03**/MF **A01**
Nevada State Library, Carson City.
Nevada Statewide Library Development Planning Documents. Basic State Plan, Long Range Program, 1979-1983. Annual Program, 1979,
Joseph J. Anderson. 1979, 47p
See also Annual Program rept. dated 1977, PB-268 415. Sponsored in part by Office of Education, Washington, DC.

The Long Range Program serves as a framework spelling out statewide library needs, goals, and objectives in relation to which program and project activities can be developed, implemented and evaluated.

PB80-107592 CP **T16**
Economics, Statistics, and Cooperatives Service, Washington, DC. Data Services Center.
Time-series Database Management System (T-DAM).
Software,
Robert Lee Otto. 9 Jan 79, mag tape USDA/DF-79/006
Source tape is in EBCDIC character set. Character set restricts preparation to 9 track one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products, if you have questions. Price includes documentation, PB80-107600, and PB80-107618.

T-DAM is a database management system designed specifically for economic time-series data. It was designed to provide users with an interactive on line capability of accessing files or subsets of files within a centralized data base.

PB80-107600 PC **A05**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. Data Services Center.
Time-series Database Management System (T-DAM). Version 3.01,
Robert Lee Otto, and Harper G. Grimm, Jr. 9 Oct 79, 93p USDA/DF-79/006A
For system on magnetic tape, see PB80-107592. See also PB80-107618.

T-DAM is a database management system designed specifically for economic time-series data. It was designed to provide users with an interactive on line capability of accessing files or subsets of files within a centralized data base. This report contains documentation on how to load, manage, and use this system. Specific instructions in management, limitations, policy, and some sample tasks are presented.

PB80-107618 PC **A08**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. Data Services Center.
Time-series Data Base Management System (T-DAM). User's Guide, Version 3.00,
Robert Lee Otto. Sep 78, 160p USDA/DF-79/006B
For system on magnetic tape, see PB80-107592. See also PB80-107600.

T-DAM is a database management system designed specifically for economic time-series data. It was designed to provide users with an interactive on line capability of accessing files or subsets of files within a centralized data base.

PB80-111883 PC **A11**/MF **A01**
Indiana Univ. at Bloomington. Research Center for Library and Information Science.
The Impact of Periodical Availability in Libraries on Individual and Library Subscription Placement and Cancellation.
Final rept. 7 Jan 78-11 Jan 79,
Herbert S. White, and Bernard M. Fry. Oct 79, 240p
Grant NSF-IST78-09182

The study examines motivations behind the decisions by libraries and individuals to subscribe to or cancel scholarly and research journals. Through the distribution of four questionnaires, specific answers were sought concerning specific decisions made during the past year. Individual New Subscribers were questioned as to reasons for their decision to subscribe, their length of readership, and the ways they learned of the journal and came to consider it important. Individual Cancellers were asked for the reasons behind their decision to cancel, their continued use and means of access to the journal, their awareness of alternative access as a factor in their cancellation, and potential factors which might prompt resubscription. In particular, individuals were questioned about the impact of library policies and availability of library copies on their decisions to subscribe or cancel. Library New Subscribers were asked whether this was a new subscription, a resubscription, or a duplicate copy, factors which prompted the decision, and the perception of permanence of the new subscription. Library Cancellers were asked about the type of subscription cancelled, the forces which impelled the decision, and the influence of library network and consortia policies and availability of the journal on Interlibrary Loan as factors in the decision to cancel. They were also asked to report frequency of borrowing since the cancellation, and to estimate the probability of resubscription.

PB80-112071 PC **A04**/MF **A01**
California Univ., San Diego, La Jolla.
California Sea Grant College Program Directory 1979-1980.
1979, 53p SG-70, IMR-79-103, NOAA-79092702 NOAA-04-8-M01-189
See also PB-299 055.

The projects of the California Sea Grant College Program funded during 1979 and 1980 are listed in this directory. It gives project titles, numbers, and project leaders, as well as (federal/matching) funding levels. It is organized by subject area, and each citation includes a brief description of project objectives.

PB80-112295 PC **A15**/MF **A01**
Coopers and Lybrand, Washington, DC.
An Analysis of the Justice Retrieval and Inquiry System (JURIS): Executive Summary.
Final rept.
13 Nov 79, 345p JAOMF-79-C-0072
Contract JAOMF-79-C-0072

The document examines and compares the computer-assisted legal research (CALR) capabilities and costs of three systems: the Justice Retrieval and Inquiry System (JURIS), LEXIS, a service of Mead Data Central, Inc., and WESTLAW, offered by West Publishing Company. The study attempts to develop an accurate statement of current, recurring operating costs and projected costs of JURIS, and cost projections for the other systems identified.

PB80-801061 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Interlibrary Loans (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Mary E. Young. Nov 79, 149p
Supersedes NTIS/PS-78/1179, NTIS/PS-77/1087, NTIS/PS-76/0994, and NTIS/PS-75/813.

The bibliography summarizes studies concerning interlibrary loans at state, university, and medical libraries; manual and automatic methods; use of teletype networks for interlibrary communication; and cost effectiveness of interlibrary loans. (This updated bibliography contains 142 abstracts, 20 of which are new entries to the previous edition.)

5C. Economics

AD-A075 096/8 PC **A05**/MF **A01**
Research and Analysis Office (Navy) Camp H M Smith HI
United States Dependence on Imports of Nonfuel Minerals,
Karl H Eulenstein. 21 Jun 79, 88p Rept no. 2-79

Of the 47 major nonfuel mineral commodities imported by the United States in 1978, imports of 12 must continue from sources beyond the Western Hemisphere during a crisis. The U.S. is not self-sufficient in these 12 minerals, and they are not obtainable from Western Hemisphere sources in sufficient quantity to meet U.S. demand. Imported quantity of four of the twelve--industrial diamonds, platinum metals, gallium and germanium--is small enough to permit transport by air. The remainder, listed below, have to be transported by sea lanes from South Africa or Australia. (Author)

AD-A075 266/7 PC **A06**/MF **A01**
Kaitz (Edward M) and Associates Inc Washington DC
The Capital Budgeting Policies of the U. S. Shipbuilding Industry: An Analysis of Defense Industry Behavior.
Final rept. Jul 78-Oct 79.
Oct 79, 120p Rept no. EMK-79-2
Contract N00014-78-C-0669

This study investigates and analyzes the factors influencing recent capital budgeting policies of the U.S. shipbuilding industry. A description of the decisional elements involved in past capital investment programs of U.S. shipyards and the effect these programs have had on shipbuilding capability and capacity have been derived from an analysis of a selected sample of U.S. shipyard data. This study not only explains the investment policies of the shipbuilding industry, but also relates these policies to the behavior of the defense industry and the defense industrial base as these terms are usefully defined in the study. Comparisons are made between (1) the defense industry and commercial sector industries, and (2) the platform industry, per se--i.e., ships, aircraft, missiles, and armored vehicles, and those firms that manufacture mission-related equipment. This study is at once conclusive and exploratory: Conclusive in its explanation of the dynamics of the U.S. shipbuilding industry and exploratory in that it points to critical unanswered questions about the overall structure of the U.S. economy in general and the defense industries in particular.

AD-A075 440/8 PC **A03**/MF **A01**
Army Command and General Staff Coll Fort Leavenworth Ks
An Analysis of Minority and Small Business Development, with Emphasis on the U.S. Air Force's Participation in the Section 8(a) Minority and Small Business Development Program.
Research study,
B. R. Gamble. May 79, 40p

The Section 8(a) Program of the Small Business Act is the central area for discussion in this paper as this program purports to assist minority and small business economically, technically, and managerially. The Air Force, as are all federal agencies, is enjoined to support the 8(a) Program through the procurement process. Numerous 8(a) contracts are written yearly that total in the millions of dollars. The subject to be discussed concerns how much or in what ways these contracts contribute to minority and small business development and expansion, i.e., the purpose of the Section 8(a) Program. A combination of published and unpublished materials augmented by personal interview conducted by the author are used in this study. Results of a quantitative analysis concerning Air Force participation in the 8(a) Program are also offered for review. Air Force experience with the Section 8(a) Program has been satisfactory from a monetary expenditure viewpoint. However, further research is required to determine the business development impact that Air Force procurements have had on small minority business development and expansion.

BTHE-042013 PC**$200.00**
British Standards Institution, Hemel Hempstead (England). Technical Help to Exporters.
Machine Tools in the Federal Republic of Germany.
Special investigation rept.
c1979, 53p ISBN-0-905877-66-7
Price to members $160.00.

Manufacturers of equipment intended for sale to the Federal Republic of Germany are obliged to ensure that their equipment meets the require-

ments of the relevant legislation. The major legislation in this respect is the Equipment Safety Law which requires that equipment shall comply with safety regulations and be constructed in accordance with accepted engineering practice. This law has given rise to regulations which specify a number of technical documents issued by generally recognized organizations. This publication includes information on the applicable legislation, electrical and mechanical regulations, national and international standards and the various codes of practice relating to machine tools, their components and accessories. The voluntary and mandatory approval and test requirements are also outlined, and the general test principles for testing are given in Section 6. Appendices 2 and 3 list the legally accredited test centers and their scope. Section 9 details the applicable legislation, regulations, national and international standards in the electrical and mechanical fields. To facilitate reference the national mechanical standards are grouped into separate sections in accordance with their subject matter. Similarly grouped are the lists of legislative documents with which compliance is mandatory. The addresses of organizations referred to in the publication are listed in Appendix 3.

HRP-0027401/9 Not Available NTIS
Federal Trade Commission, Washington, DC. Bureau of Economics.
Competition in the Health Care Industry.
Warren Greenberg. 1978, 6p
Pub. in Forum v2 n3 p31-36 1978.

Viewpoints on competition presented at a conference sponsored by the Federal Trade Commission's Bureau of Economics are summarized. Four major findings on competition evolved from the conference: (1) competition exists in the health care sector but it is not necessarily the type of competition prevalent in other industries; (2) there are several reasons for atypical competition in the health care sector, including the pervasive influence of Government, the special role of physicians, and other peculiar characteristics of the health care industry; (3) the health care sector may not conform to the economist's ideal of competitive behavior, but there are no clear answers as to the most appropriate form public policy should take; and (4) there is a strong consensus that more research is needed on competition in health care. Conference presentations dealt with complex socioeconomic variables associated with the conduct of physicians, the absence of information on an appropriate price-quality level, the stress on price-oriented competition and resulting problems for maintaining a given level of quality care, advertising prohibitions, Blue Cross and Blue Shield, incentives and laws that make a return to a competitive market in the health care sector impossible, and the need for a large-scale cooperative effort between public and private entities.

N79-34093/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
The Economics of Project Analysis: Optimal Investment Criteria and Methods of Study.
M. C. Scriven. Sep 79, 32p NASA-TM-78242

Insight is provided toward the development of an optimal program for investment analysis of project proposals offering commercial potential and its components. This involves a critique of economic investment criteria viewed in relation to requirements of engineering economy analysis. An outline for a systems approach to project analysis is given Application of the Leontief input-output methodology to analysis of projects involving multiple processes and products is investigated. Effective application of elements of neoclassical economic theory to investment analysis of project components is demonstrated. Patterns of both static and dynamic activity levels are incorporated.

N79-34094/9 PC **A08**/MF **A01**
ORI, Inc., Bethesda, Md.
World Helicopter Market Study.
B. Cleary, R. W. Pearson, S. W. Greenwood, and L. Kaplan. 3 Jul 78, 170p NASA-CR-163091, TR-1342
Contract NASW-2961

The extent of the threat to the US helicopter industry posed by a determined effort by foreign manufacturers, European companies in particular, to supply their own domestic markets and also to penetrate export markets, including the USA is assessed. Available data on US and world markets for civil and military uses are collated and presented in both graphic and tabular form showing the past history of production and markets and, where forecasts are available, anticipated future trends. The data are discussed on an item-by-item basis and inferences are drawn in as much depth as appears justified.

PB80-101751 PC **A02**/MF **A01**
Council Bluffs Dept. of Planning and Community Development, IA.
The City of Council Bluffs, Department of Planning and Community Development, Final Report, August 15, 1977-June 29, 1979, Council Bluffs, Iowa.
Oct 79, 9p EDA-79/0159
Grant EDA-05-06-01730

The study is about providing technical assistance and attracting industry to locate in the Iowa-Nebraska River Industrial Park in Council Bluffs, Iowa. Council Bluffs hoped that attracting new development would alleviate some of the serious problems facing the city.

PB80-102320 PC **A06**/MF **A01**
General Accounting Office, Washinton, DC. International Div.
Stronger Emphasis on Market Development Needed in Agriculture's Export Credit Sales Program.
Report to the Congress.
26 Oct 79, 103p ID-80-01

Since 1956 the Commodity Credit Corporation has financed over $7 billion in agricultural exports under its Export Credit Sales Program. Originally initiated to help dispose of surplus commodities, the Program has become a primary means of developing foreign markets for U.S. exports. GAO recommends several administrative and statutory changes to strengthen the Program's market development objective.

PB80-102684 PC **A03**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
Consumer Attitudes Toward Food Labeling and Other Shopping Aids.
Agricultural economic rept.,
Richard B. Smith, Judy A. Brown, and Jon P. Weimer. Oct 79, 40p AER-439

Most shoppers need and want food labeling and other shopping aids, according to national surveys held in 1976 and 1977 to examine consumer food-related behavior. Survey results also indicate that open dating and individually priced food packages are particularly important to food shoppers. They want more food-storing instructions and nutrition data, while calling for prethaw information on frozen food packages. Shoppers in large households and those with children have a significantly greater interest in most of the shopping aids. Male shoppers, the elderly, and the less educated are least influenced by labeling information.

PB80-105489 PC **A03**/MF **A01**
General Accounting Office, Washington, DC. International Div.
Prospects for Cooperation and Trade of Energy Resources Between the United States and Canada.
Report to the Congress.
8 Nov 79, 41p ID-80-2

This report focuses on the way Canada deals with its energy problems and the effects of its policies on the United States. It also addresses Canada's position as a potential source of needed energy resources to the United States; and it discusses the opportunities for continued cooperativeness between the two countries on energy matters.

PB80-106230 PC **A06**/MF **A01**
Auburn Technical Assistance Center, AL.
ATAC: A Program for Management and Technical Assistance in Alabama.
Final report 1 May 78-30 Apr 79.
Jun 79, 109p EDA-79-0167
Grant EDA-04-06-01538-1
See also report dated Dec 78, PB-289 717.

The report summarizes the activities of the Auburn Technical Assistance Center (ATAC) for its second successful year of operation. The Center has made during this year significant gains in achieving its goal of facilitating the economic development of the state of Alabama through management and technical assistance. ATAC has initiated 81 projects located in all of the 12 economic development districts. Of this, all obligations have been completed on 72 of the projects, therefore, continuing the efforts on none projects. The number of jobs directly created, saved, or affected in this level of activity amount to 4,880.

PB80-108350 PC **A05**/MF **A01**
Lazar Management Group, Inc., Washington, DC.
Economic Development Administration's Title IX Program-Baseline Assessment and Policy Analysis. Volume I: Appendices A-E,
Raymond H. Milkman, Mary A.. Toborg, Anthony M. J. Yezer, Rebecca Aikman, and Una Maria Perez. Sep 78, 100p
See also Volume 2, Appendix F, PB80-108368.

The report assesses the Economic Development Administration's Title IX Program. Volume I contains the following: (1) Summary table providing characteristics by type of grant; (2) Brief descriptions of Title IX projects; (3) Title IX grant summaries; (4) Economic analysis of the Title IX programs and (5) Data source documentation.

PB80-108368 PC **A07**/MF **A01**
Lazar Management Group, Inc., Washington, DC.
Economic Development Administration's Title IX Program-Baseline Assessment and Policy Analysis. Volume II: Appendix F,
Raymond H. Milkman, Mary A. Toborg, Anthony M. J. Yezer, Rebecca Aikman, and Una Maria Perez. Sep 78, 139p
See also Volume 1, Appendices A-E, PB80-108350 and Volume 3, Appendix G, PB80-108376.

The report assesses the Economic Development Administration's Title IX Program, Volume II contains the following interview guides: pre-visit telephone interview; project applicants planner guides; project manager guides; elected official guides; and union representative guide.

PB80-108376 PC **A07**/MF **A01**
Lazar Management Group, Inc., Washington, DC.
Economic Development Administration's Title IX Program-Baseline Assessment and Policy Analysis. Volume III: Appendix G,
Raymond H. Milkman, Mary A. Toborg, Anthony M. J. Yezer, Rebecca Aikman, and Una Maria Perez. Sep 78, 150p
See also Volume 2, Appendix F, PB80-108368.

The report assesses the Economic Development Administration's Title IX Program. Volume III contains descriptions of the development grants, implementation grants, and the combined development and implementation grants.

PB80-113038 PC **A03**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. Economic Development Div.
Income Growth in Nonmetro America, 1968-75.
Rural development research rept.,
Herman Bluestone. Aug 79, 27p RDRR-14
Color illustrations reproduced in black and white.

Total personal income includes income from earnings, property income, and net transfer payments. The report examines personal income growth at the national and regional levels. Income growth among nonmetro counties is analyzed.

5D. History, Law, and Political Science

AD-A075 043/0 MF **A01**
Naval Justice School Newport RI
Basic Military Justice Handbook. Revised.
Jul 79, 648p
Supersedes report dated Aug 78, AD-A059 207.
Availability: Microfiche copies only.

This publication is designed to simply explain the rather complex legal principles and procedures in-

herent in the military justice system in order to assist the commanding officer, executive officer, legal officer, and discipline officer in discharging their responsibilities under the Uniform Code of Military Justice. In some cases the explanations of law have been somewhat over-simplified for the purpose of clarity and represent only general rules. There may be some uncommon situations where the general rule does not properly resolve the problem. Accordingly, the publication should not be utilized without supplementary legal research.

AD-A075 053/9 PC **A21**/MF **A01**
Naval Justice School Newport RI
Civil Law Study Guide. Revised.
Sep 79, 496p
Supersedes report dated Feb 78, AD-A059 210.

No abstract available.

AD-A075 054/7 PC **A19**/MF **A01**
Naval Justice School Newport RI
Military Justice Criminal Law Study Guide. Revised.
Oct 79, 429p
Supersedes report dated Sep 78, AD-A059 208.

This study guide is a primary resource in the Naval Justice School course in military criminal law. The purpose of the course is to enable military attorneys to provide professionally competent legal services in matters involving substantive questions of military criminal law. Specifically, at the end of the course, the military attorney will be able to develop correct legal analyses and solutions to criminal law problems. This process involves two basic legal skills which will be developed in the course: (1) accurate identification of the decisive issues in a factual situation; and (2) correct application of principles of military criminal law. This study guide is also intended to be a convenient reference in military criminal law, for use by Navy and Marine Corps judge advocates. While this study guide does not cover all the possible offenses under the Uniform Code of Military justice, it provides detailed discussions of the fundamental concepts of criminal liability, defenses, and pleading, as well as of the offenses which are most commonly encountered in contemporary military criminal practice. As such, this study guide should be only a starting point for legal research, and not a substitute for it. (Author)

AD-A075 055/4 PC **A20**/MF **A01**
Naval Justice School Newport RI
The Military Law of Evidence. Revised.
Nov 78, 453p
Supersedes report dated Jun 78, AD-A059 209.

No abstract available.

AD-A075 056/2 PC **A25**/MF **A01**
Naval Justice School Newport RI
Military Justice Procedure Study Guide. Revised.
May 79, 589p
Supersedes report dated May 78, AD-A061 124.

No abstract available.

AD-A075 580/1 PC **A08**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Oh School of Systems and Logistics
A Dynamic Policy Model of the United States Arms Transfer Process.
Master's thesis,
Douglas C. Chipman , and John T. Cunningham.
7 Sep 79, 172p Rept no. AFIT-LSSR-9-79B

The transfer of arms between countries plays a significant role in the political, economic, and military affairs of the entire world, and is, consequently, subject to constant criticism and review from many quarters. Because of the complexity of the relationships in, and the diversity of opinion about arms transfer, a concise policy which will satisfy everyone is virtually impossible to devise. This thesis is an attempt to bring together all of the significant variables concerning the arms transfer system, with particular emphasis on the welfare of United States national interests. While this model will not be able to produce policies which will keep all interested parties satisfied, it should depict the consequences of arms transfer decisions in terms of the major variables. The model will also facilitate the examination of policies such as the dollar ceiling on sales in terms of impact on the strategic position and economy of the United States. (Author)

PB80-105737 PC **A07**/MF **A01**
National Park Service, Denver, CO. Historic Preservation Team.
Cape Cod, National Seashore/Massachusetts. Historic Resource Study,
Berle Clemensen. Feb 79, 129p FNP-560-79-3

The report is a study of the history of Cape Cod National Seashore. The report begins with the early prehistory of the region and continues to the end of the nineteenth century. Individual chapters focus on Indians, explorers, pilgrims and other groups that have lived on or impacted the History of the Cape. Other topics covered by the report include a discussion of the resources and economy of the Cape, shipwrecks and harbor defenses. Included throughout the report are period maps and photographs. An appendix, containing a list of furnishings for the old harbor life saving stations, and a bibliography are included at the rear of the report.

PB80-801103 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Civil Insurgency (A Bibliography with Abstracts).
Rept. for 1964-Oct 79,
Edith Kenton. Nov 79, 161p
Supersedes NTIS/PS-78/1018, NTIS/PS-77/0916, NTIS/PS-76/0765, NTIS/PS-75/700, and NTIS/PS-75/002.

The bibliography contains selected references covering insurgency and counterinsurgency in various countries. Citations relating to political affairs are included, as well as some references on terrorism. (This updated bibliography contains 153 abstracts, 16 of which are new entries to the previous edition.)

5E. Human Factors Engineering

AD-A075 610/6 PC **A02**/MF **A01**
Army Aeromedical Research Lab Fort Rucker Al
A Direct Measure of CRT Image Quality,
Robert W. Verona , Harry L. Task , Victor C. Arnold , and James H. Brindle. Sep 79, 24p Rept no. USAARL-79-14
Presented at the Society of Photo-Optical Instrumentation Engineers International Symposium, San Diego, 27 Aug-1 Sep 79.

This paper describes a direct measuring technique for determining the image quality of raster-scanned cathode-ray tube (CRT) displays. This technique is based on the Modulation Transfer Function (MTF) theory and human visual psychophysical data. The rationale for the technique is discussed from a theoretical as well as functional viewpoint. The instrumentation necessary to obtain these measures in manual and automatic modes is discussed. Data obtained using this measurement technique are analyzed and compared with the theoretical performance of the displays. The image quality of new CRT displays procured for the U.S. Army's Advanced Attack Helicopter is being specified and tested using this direct measuring technique. (Author)

N79-32837/3 PC **A02**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
The Use of Artificial Signals During Sonar-Watch.
W. A. Wagenaar, and A. F. Sanders. 1978, 7p IZF-1978-25, TDCK-71719

The detection of submarines using CW 610 sonar on board Van Speyk class frigates was evaluated and found to be less than optimal. This loss in detection efficiency is attributed to degradation in operator's vigilance. As a possible solution to the vigilance problem operators were required to monitor the screen only for a short period of time (20 to 30 minutes) after which they either relaxed, or worked on something else, for the same length of time. However, laboratory experiments show that if the rest period is also rather unstimulating alertness is not improved. As an alternative, the frequent presentation of artificial signals, or echoes (without the operator knowing when or where such a signal will occur) was tried and knowledge of results about the detection of these artifical signals was provided to him. Results show that real signals are detected better under such circumstances and, moreover, that lapses of attention are counteracted.

5G. Linguistics

N79-32976/9 PC **A02**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
Comparison of Some Methods for Measuring Speech Levels.
H. J. M. Steeneken, and T. Houtgast. 1978, 19p IZF-1978-22, TDCK-71655

Some methods for measuring speech levels were compared as test material running speech as well as embedded test words were used. On the basis of the measurement results a selection was made between preferred and other methods, with respect to application of a threshold (to ignore silent periods), reproducibility, band pass limiting, and the relation to intelligibility. Results show that methods based on peak readings are independent of silent periods. Methods in which the envelope is sampled also offer an obvious seperation between silent periods and speech periods. Methods in which A-filtered speech signals are used show a closer relation with intelligibility than methods without any bandpass filtering. In general, for all measurements, reproducibility and absolute accuracy fall within one dB, with the exception of peak-reading methods. Here, variable dynamic behavior among instruments lead to results with a considerable spread.

5H. Man-Machine Relations

AD-A075 199/0 PC **A13**/MF **A01**
Massachusetts Inst of Tech Cambridge Man-Machine Systems Lab
SUPERMAN: A System for Supervisory Manipulation and the Study of Human/Computer Interactions.
Technical rept. 15 Jun 78-30 Jun 79,
Thurston Leondus Brooks, III. 11 May 79, 280p
Contract N00014-77-C-0256
Master's thesis.

This thesis considers the need for supervisory control of remote teleoperator vehicles in the ocean environment, and shows that computer controlled systems can increase the effectiveness of remote manipulation. A distinction is made between absolute tasks (tasks which have a known spatial relationship to the manipulator base prior to execution) and relative tasks (tasks which cannot be spatially defined prior to execution). A second distinction is made between fixed tasks (tasks which remain fixed with respect to the manipulator base during execution) and moving tasks (tasks which continuously move with respect to the manipulator base during execution). Four distinct combinations can be made from this 2x2 array: (1) fixed-absolute tasks, (2) fixed-relative tasks, (3) moving-absolute tasks, and (4) moving-relative tasks. Mathematical principles are developed to deal with each of these four possibilities.

N79-32834/0 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
Performance and Workload Analysis of Inflight Helicopter Missions.
P. H. Wewerinke. 10 Apr 79, 34p NLR-MP-77013-U
Subm-Sponsored by Res. Branch of the Directorate of Mat. Air Rnlaf. Conf-Presented at 13th Ann. Conf. On Manual Control, Cambridge, Mass., 15-17 Jun. 1979.

The potentials of an optimal control model for predicting the characteristics of realistic operational helicopter missions were assessed. The theoretical and experimental results indicate that the optimal control model succesfully predicts the best attainable (rather than the average) performance of a group of well-trained, highly motivated subjects.

Furthermore, the model allows a description of inter-subject variability. The control effort model predictions are supported by subjective ratings. The model provides a meaningful representation of pilot workload relative to complex control tasks.

N79-32838/1 PC **A04**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
Car Driving as a Cybernetic Task.
G. J. Blaauw. 1979, 71p IZF-1979-6, TDCK-71982
In Dutch; English Summary.

The possibilities of cybernetics in analyzing driver's behavior quantitatively are evaluated. Several task analyses of driving are surveyed. The results of this survey are used systematically in presenting the available cybernetic models of driving. The cybernetic models of driving are grouped with respect to the number of input signals (as related to driver's search) and to the implementation of future information of signals (as related to driver's prediction). Models are described for lateral control as well as longitudinal control (car following). Models are not yet available for combinations of driving tasks. The representation consists of an estimated value and an uncertainty around the estimate for each state. Both values for all states initiate (1) an increase in attention to any state for which the uncertainty becomes too high, and (2) the execution of control actions. This model structure permits an analysis of the multivariable driving task in terms of supervisory control. As a result, driver's internal criterion can be determined in relation to driving experience, among other things.

5I. Personnel Selection, Training, and Evaluation

AD-A075 143/8 PC **A04**/MF **A01**
Navy Personnel Research and Development Center San Diego CA
The Use of Preenlistment Variables to Predict the Attrition of Navy Female Enlistees.
Final rept. 1 Oct 76-30 Jul 78,
Gerry L. Wilcove, Patricia J. Thomas, and Constance Blankenship. Sep 79, 66p Rept no. NPRDC-SR-79-25

Although the attrition rate for first-term enlisted women has been decreasing, it is still unacceptable to the Navy. The purpose of the present study was to conduct the exploratory research necessry to develop a questionnaire for screening female applicants. Attrition factors were identified from interviews and from research on turnover, mental health, sex roles, and vocational choice. These factors were used to construct two experimental questionnaires (QUEST 1 and QUEST 2). One or the other of the questionnaires was administered to each of 997 female recruits. Empirical keying was employed to create 'response-option' scales to predict attrition, which were then validated. (Author)

AD-A075 202/2 PC **A03**/MF **A01**
Human Resources Research Organization Alexandria VA
A Pilot Study of Army Recruiters: Their Job Behaviors and Personal Characteristics.
Final rept.,
Warren R. Graham, George H. Brown, William L. King, Lenore White, and Mark D. Wood. Apr 75, 50p Rept no. HUMRRO-FR-ED-75-9
Contract DAHC19-73-C-0004

Structured interviews were conducted with 79 Army recruiters to obtain information on the nature of recruiting duty, as a basis for developing hypotheses on the personal characteristics and job behaviors associated with recruiter success. Illustrative findings show that high producers (a) are less likely than low producers to cite 'independence' as a source of job satisfaction, (b) tend to complain more about their long hours of work, (c) mention less often that they had trouble communicating effectively, and (d) describe themselves less often as 'empathetic'. Responses describing 'successful' and 'unsuccessful' recruiters appeared to reflect only stereotypical notions. Prospecting and selling techniques are described, and recruiters opinions on training and selection are reported. (Author)

AD-A075 209/7 PC **A06**/MF **A01**
Dynamics Research Corp Wilmington MA
Human Resources, Logistics, and Cost Factors in Weapon System Development: Demonstration in Conceptual and Validation Phases of Aircraft System Acquisition-Appendix A.
Interim rept. Oct 77-Jul 78,
Gerard F. King, and William B. Askren. Sep 79, 115p AFHRL-TR-79-28(II)
Contract F33615-77-C-0016
Appendix A to rept. no. AFHRL-TR-79-28(i), AD-A075 272.

The Coordinated Human Resource Technology and the Consolidated Data Base have been demonstrated in the conceptual and validation phase of weapon system acquisition. The results of this demonstration are reported in AFHRL-TR-79-28(I). This report (volume II) constitutes Appendix A to that demonstration report and provides additional details of the demonstration. (Author)

AD-A075 220/4 PC **A03**/MF **A01**
Carnegie-Mellon Univ Pittsburgh PA Management Sciences Research Group
Ratio Goal Programming for Personnel Assignments.
Management sciences research rept.,
Samuel J. Siverd, and Gerald L. Thompson. Sep 79, 30p Rept nos. MSRR-441, WP-22-79-80
Contracts N00014-75-C-0621, N00014-76-C-0932

Various optimization techniques have been applied to meet manpower palnning and staffing goals. Attainment of these goals is usually accepted as a surrogate for attaining the maximum organizational effectiveness. However, the goals of most of these techniques are exogenous and the way they are determined has been generally ignored. This paper presents a novel formulation of manpower goals which is stated in terms of attaining optimal ratios of personnel desired between the various skills employed in an organization. This framework stresses the importance of the appropriate mixture of skills in the various units of an organization, not just the total number of people assigned. A technique called RATIO GOAL PROGRAMMING is presented and an example illustrates staffing an organization by minimizing a weighting of the squared deviations form the ideal ratios and the unit personnel ceilings. (Author)

AD-A075 222/0 PC **A02**/MF **A01**
Carnegie-Mellon Univ Pittsburgh PA Management Sciences Research Group
Computational Efficiency in the AMIS Naval Officer Rotation Model.
Management sciences research rept.,
Samuel J. Siverd, and Gerald L. Thompson. 1979, 24p Rept nos. MSRR-442, WP-23-79-80
Contracts N00014-75-C-0621, N00014-76-C-0932

Recent changes in a large scale macro planning model used to determine a 'best fit' of Naval Officers and billets are discussed. Problem reformulation from a linear program to a sparse transportation model is followed and the implementation of an advanced start procedure to achieve solution continuity is also presented. Suggestions are made for further research that would enhance the applicability of the model. (Author)

AD-A075 230/3 PC **A04**/MF **A01**
Naval Postgraduate School Monterey CA
A Study of Surface Warfare Junior Officer Retention.
Master's thesis,
Jimmy Wayne Parker. Sep 79, 71p

The retention of naval officers is often assumed to be independent of the economic circumstances of the individual. This study makes use of classical, normal linear least squares regression techniques and recent surface warfare officer retention data in an attempt to determine whether the retention of lieutenants can be related to a set of economic control variables. In the pursuit of that goal, several previously developed econometric models which describe first-term enlisted retention are modified for use on officer data and compared for goodness of fit. (Author)

AD-A075 232/9 PC **A05**/MF **A01**
Wharton Econometric Forecasting Associates Philadelphia PA
Interim Report on Economic and Manpower Forecasting. Volume I.
Jul 79, 82p
Contract N00014-76-C-0782
See also Volume 2, AD-A075 270.

This report summarizes the research conducted during the second year of the Wharton Econometric Forecasting Associates project for the Office of Naval Research. The main thrust of the research is to evaluate the labor supply needs and potential of the Navy in the context of an overall econometric model.

AD-A075 235/2 PC **A03**/MF **A01**
Naval Postgraduate School Monterey CA
Internal Consulting, A Key Element in the Integrated Approach to Modern Problem Solving.
Master's thesis,
Wayne James Vanderslice. Sep 79, 49p

All very large organizations are beset with problems, some of which are beyond the expertise of management. The Navy is no exception. In an effort to rectify these problems the private sector is placing heavy reliance on management consulting services. Internal consultants are playing an increasingly significant role in that process in conjunction with their external counterparts. Therefore, it seems logical to incorporate, in an integrated approach, the prudent use of internal, as well as external, consultants to assist Navy management to economically solve their problems. This thesis supports such an integrated approach. (Author)

AD-A075 241/0 PC **A03**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Dynamic Characteristics of Flight Simulator Motion Systems.
Advisory rept.,
Sep 79, 42p Rept no. AGARD-AR-144

In the last five years, there has been a sharp rise in the number of simulation facilities employing multiple degree-of-freedom motion systems; however, until recently no substantive attempts have been made to measure the performance of these systems. Those measurements that have been made and published have not been made in a uniform way, so that it is difficult to compare different systems. While data on the gross excursions, velocities and accelerations of these systems have been generally available in the literature, dynamic response, noise and other imperfections were usually neither carefully measured nor was information on them widely distributed. This report specifies a uniform method of measuring and reporting motion performance characteristics, developed by a Working Group of the Flight Mechanics Panel of AGARD. Such a uniform method, in addition to aiding system comparison, can assist in system diagnosis and might be used in writing performance specifications. The definitive characteristics selected for system description are excursion limits, describing function, linearity and acceleration noise, hysteresis, and dynamic threshold; definitions and methods of measurement and display are given, illustrated by measurements on particular motion systems.

AD-A075 247/7 PC **A07**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria Va
Multiple Integrated Laser Engagement Simulation (MILES) Training and Evaluation Test (TET) Evaluator Guidebook.
Research product rept.,
Steven M. Medlin , Kenneth I. Epstein , Robert G. Wanschura , Angelo Mirabella , and G. Gary Boycan. Sep 79, 149p Rept no. ARI-RP-79-11

The purpose of this guidebook is to train the senior controller/evaluator and his staff how to conduct an external evaluation of an Army Training and Evaluation Program (ARTEP) exercise and how to provide feedback that can be used to structure subsequent training programs. The instruction includes how to observe a field exercise, what to observe, how to record your observations, and how to use your observations to provide feedback to the unit. Data collection instruments and feedback procedures are presented and described. The appendices include an example training and evaluation outline, an example feedback package,

sample data forms, and sample activity record cards. This document serves as a 'textbook' during evaluator training and can be used as a reference to answer questions that may arise during the evaluation of field exercises. (Author)

AD-A075 270/9 MF **A01**
Wharton Econometric Forecasting Associates Philadelphia PA
Interim Report on Economic and Manpower Forecasting. Volume II.
Jul 79, 238p
Contract N00014-76-C-0782
See also Volume 1, AD-A075 232.
Availability: Microfiche copies only.

No abstract available.

AD-A075 272/5 PC **A05**/MF **A01**
Dynamics Research Corp Wilmington MA
Human Resources, Logistics, and Cost Factors in Weapon System Development: Demonstration in Conceptual and Validation Phases of Aircraft System Acquisition.
Interim rept. Oct 77-Jul 78,
Gerard F. King, and William B. Askren. Sep 79, 96p AFHRL-TR-79-28(1)
Contract F33615-77-C-0016
See also Appendix A, AD-A075 209.

A methodology, the coordinated human resource technology (CHRT), was developed to quantify critical human resource, logistics, and cost factors throughout aircraft acquisition. Knowledge of these factors helps influence the selection of a system and support design approach. The factors quantified are manpower, training, technical documentation, and system ownership costs. Reliability and maintainability, both of which directly affect the foregoing, are also quantified. The CHRT methodology also implements an integrated approach to personnel, training, and technical documentation, and operates from a single, evolving consolidated data base. This report describes two parts of a three-part demonstration of CHRT application on an aircraft acquisition program. Parts 1 and 2, respectively, use conceptual and validation (prototype) phase data on avionics and landing gear systems of the Advanced Medium STOL Transport (AMST). The results are presented and evaluated for various design, personnel, training, and technical data alternatives. CHRT is demonstrated as an acquisition management tool which initiates the development of detailed logistic and cost data early in acquisition and provides data source continuity throughout acquisition. Part 3 of the demonstration will use data projected for the AMST minimum engineering development (MED) phase. This phase is similar to full-scale development. (Author)

AD-A075 273/3 PC **A08**/MF **A01**
Consad Research Corp Pittsburgh PA
Design of a National Skills Market Model for Air Force Enlisted Personnel.
Final rept.,
Frederick H. Rueter, R. Gregg Hillman, and Thomas R. Bell. Sep 79, 173p AFHRL-TR-79-32
Contract F33615-76-C-0029

This technical report documents the detailed specifications developed in this study describing feasible options available for designing and implementing the National Skills Market Model - an empirically based forecasting model of economic activity in the industrial and occupational labor markets in which the Air Force competes for labor. Essentially, the model formulated in this study consists of three basic analytic components which, in combination, produce detailed forecasts of national labor market conditions, and generate projections in the total accession and retention of Air Force enlisted personnel. The basic analytic components include a non-military labor market module, a population projection module, and an accession/retention rate forecasting module. Each of these components is then subdivided into one or more analytic elements which address distinct aspects of the general issue examined in the analytic component. In all, nine analytic elements are included in the modular design of the model. The report describes the functions to be performed by each of the analytic components and elements, and specifies the procedures through which each element has been designed to accomplish its functions. Recommendations for the development and implementation of the model are presented also. Detailed supporting information is provided in appendices. (Author)

AD-A075 276/6 PC **A05**/MF **A01**
WICAT Inc Orem UT
A Study of Authoring Alternatives for Training-Oriented Videodiscs.
Final rept.,
C. Victor Bunderson, Stanley Jarvis, and Robert W. Mendenhall. Sep 79, 85p NPRDC-TR-79-33
Contract N66001-78-C-0036

Videodisc technology shows great promise for use in a variety of training and information dissemination activities within the Navy. Little is known about the problems and procedures associated with the authoring of training-oriented videodiscs, however. This study addresses eight areas that are related to the problems of authoring. These include the delivery system itself (i.e., the various capabilities of players and associated computer devices), media selection during instructional systems development, instructional strategies, author mockup and simulation prior to premastering, premastering, mastering and replication, composition of videodisc authoring teams, and evaluation alternatives. It was concluded that optical videodisc technology and the authoring technologies associated with it are still in a state of flux and are expected to be changing and evolving during the next 5 years. Thus, the Navy should not plan to deploy videodiscs widely in the immediate future. Rather, the Naval Education and Training Command and its supporting agencies should track the development of knowledge in the videodisc field, which is expected to unfold rapidly in the next 2 years. (Author)

AD-A075 288/1 PC **A09**/MF **A01**
Human Resources Research Organization Alexandria Va
An Authoring Aid for the PLATO IV CAI System. Lesson Moniform.
Feb 76, 185p ARI-P-76-1
Contract DAHC19-73-C-0004

This text is a programmed guide for the use of HumRRO-developed authoring aids for the PLATO IV Computer-Administered Instruction (CAI) system. These authoring aids, which we call Monitoring Formats (MONIFORMS), may be used by any individual who is preparing instructional material for the PLATO IV system. MONIFORMS represent partially completed codes in the TUTOR programming language and are used to create certain frequently used question types, such as multiple choice, constructed response, and matching questions. MONIFORMS require the author to provide only information relevant to his specific question, such as the text for the question, feedback messages for correct and incorrect responses, and instructions for analyzing the student's response. A user of MONIFORMS need not to be skilled in the TUTOR programming language. He need know only basic editing procedures for the PLATO system. In addition, question preparation time is greatly reduced; any question prepared with MONIFORMS can be completed within 10-15 minutes. This text contains only guidance for question preparation using MONIFORMS. Individuals interested in the rationale and development process of MONIFORMS are referred to a companion document (HumRRO report in preparation), 'MONIFORMS as Authoring Aids for the PLATO IV CAI System.' The material in this guide is also available in CAI form on the PLATO IV system in Lesson 'moniform'. (Author)

AD-A075 307/9 PC **A08**/MF **A01**
Bendix Corp Ann Arbor MI
Evaluation of Early Enlistment Failures under the U.S. Army Trainee Discharge Program.
Technical rept.,
Ronald G. Bauer, Thomas J. Miller, Mary I. Dodd, and David R. Segal. Nov 75, 171p ARI-TR-75-B1
Contract DAHC19-75-C-0027

This report describes the results of a six-month exploratory research project designed to provide the Department of the Army with a profile of individuals discharged under the Trainee Discharge Program (TDP). In this report, we will focus especially on the results of our efforts to develop a sociological and psychological profile of the individuals who are discharged under the Program, the reasons they are discharged, and the manner in which the TDP discharge process is performed.

AD-A075 327/7 PC **A02**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Development of Light-Attenuating Devices (LADs) to Simulate Night Visibility during Daylight.
Technical paper,
Paul R. Bleda, and John P. Farrell. Jul 79, 23p
Rept no. ARI-TP-375

To circumvent safety, evaluation, and logistics problems in nighttime training, ARI has developed light-attenuating devices (LADs) to simulate night visual conditions and allow daytime training. Both single-density and bidensity lenses have been developed for a variety of facemasks. This report documents ARI's role in developing and fabricating LADs and discusses potential applications for training. Using LADs to simulate night visibility for night training and testing may be more advantageous than actual night training for several reasons. First, safety: With single-density LADs, someone with full vision can monitor trainees' performance. Second, performance evaluation: Instructors working in daylight can better observe and evaluate trainees' performance. Third, convenience: Daylight is a more convenient time for many qualifications tests. (Author)

AD-A075 354/1 PC **A06**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Armor/Anti-Armor Team Tactical Performance.
Research rept.,
Thomas D. Scott, Larry L. Meliza, Guthrie D. Hardy, Jr., and James H. Banks. Jul 79, 114p
Rept no. ARI-RR-1218
See also Rept. no. ARI-TR-S-4, AD-024 030, and Rept. no. ARI-RR-1191, AD-A034 610.

A field experiment was carried out to determine the effectiveness of REALTRAIN engagement simulation training and to identify tactical team performances associated with mission accomplishment. Eight armor/anti-armor units received a pretraining tactical test, 5 days of tactical training using either REALTRAIN or conventional methods, and a posttraining test. REALTRAIN units were more likely to accomplish their mission. Successful units displayed sound tactical behavior in planning the attack, initial deployment, use of cover and concealment, surveillance, and use of firepower, regardless of type of unit or mission. (Author)

AD-A075 375/6 PC **A05**/MF **A01**
Center for Creative Leadership Greensboro NC
Looking Glass, Inc. The First Three Years. Volume VIII. Operational Manual.
Final rept. 1 Sep 76-31 Aug 79,
Morgan W. McCall, Jr., and Michael M. Lombardo. 30 Sep 79, 96p Rept nos. CCL-TR-13, TR-5
Contract N00014-76-C-0870
See also Volume 1, AD-A063 056.

This is the Final Report to the Office of Naval Research and reviews the development and validation of a simulation of leadership in a complex organization. The report addresses the issue of the simulation's validity by (1) reviewing the development process, (2) comparing activity patterns of managers in the simulation with results from field studies, and (3) examining some results from Looking Glass in relation to findings from studies of organizational behavior. The report concludes with some research directions appropriate for the simulation. (Author)

AD-A075 380/6 PC **A11**/MF **A01**
Litton Systems Inc Sunnyvale CA Mellonics Systems Development Div
Current Use, Patterns of Use and Factors Affecting Use of the Army Training Extension Course (TEC) Program.
Technical rept.,
P. V. Mays, J. E. Holmgren, and J. B. Sheinutt. Apr 79, 227p ARI-TR-79-A3
Contract DAHC19-77-C-0011

The Army's Training Extension Course (TEC) Program consists of a large number of performance-oriented self-paced lessons (mainly audiovisual) designed to provide individual instruction for enlisted men in Army units. This report describes a research survey designed to determine the extent of use, patterns of use and factors affecting use of the TEC lessons.

AD-A075 386/3 PC **A03**/MF **A01**
MITRE Corp Bedford MA
Generation of Simulated Radar Data for Joint Surveillance System.
Technical rept.,
S. H. Duncan, and L. A. Hopkins. Sep 79, 26p
MTR-3779, ESD-TR-79-146
Contract F19628-79-C-0001

Simulated radar data are used to train personnel in the operation of the Region Operations Control Center (ROCC) in the Joint Surveillance System (JSS). Specifications for radar data generation in SAGE, BUIC, and COMBAT GRANDE are available, but these documents provide neither the rationale for nor the derivation of the radar data generation algorithms; thus, the formulation is not well understood. This report derives the algorithm for calculating the range and azimuth associated with a simulated aircraft. (Author)

AD-A075 389/7 PC **A03**/MF **A01**
Naval Training Equipment Center Orlando FL
Problem Analysis and the Program Master Plan: Key Elements in the Instruction System Development Process.
Final rept. Jan 78-Jul 79,
Joseph F. Funaro, and B. E. Mulligan. Jul 79, 26p Rept no. NAVTRAEQUIPCEN-IH-314

Training systems evaluation is an important aspect of the instructional development process as it is carried out in Naval aviation. Whether applied to an existing training system in need or revision, or to a newly emerging weapon system in need of a complete training program, an evaluative process designated as problem analysis is conducted in order to determine the nature of the instructional development that will be required to produce a cost/effective training system. This report describes the evaluative process from problem analysis through planning of the instructional development project, the major emphasis being concentrated on a description of the informational contents contained in the Problem Analysis Report, e.g., evaluations of training program goals, instructional organization, student population, student throughout, performance criteria, curricula, behavioral objectives, and instructional resources. This information constitutes a primary input to project planning and the resulting Program Master Plan, the instrument that directs and coordinates development of the revised or new training system. Consequently, a section of this report is devoted to the objectives of the program plan and their relationship to the contents of the problem analysis. (Author)

AD-A075 399/6 PC **A04**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
An Evaluation of a Technique for Using the Combat Training Theater (CTT) for Periodic Rifle Marksmanship Proficiency Training and Qualification.
Arthur Marcus, and Charles R. Hughes. May 79, 52p Rept no. ARI-RES-PROBLEM-REV-79-7

Although hit probability scores in the CTT were lower than scores from the standard outdoor range, they were similar in slope to scores obtained earlier at the Army Training Center, Fort Jackson, SC. That is, the relative difficulty of hitting targets at different distances is effectively the same in the CTT as it was at Fort Jackson. CTT performance was in general more internally consistent and better controlled and required fewer resources than did the outdoor range firing. Correlation between the practice record fire scores and record fire scores was substantially higher in the CTT than on the outdoor range. However, the correlation between CTT and the outdoor range scores was not significant; this was probably due to the unreliability of the outdoor range scores. Scores on the paper-and-pencil tests did not correlate well enough with marksmanship scores to be useful as predictors of performance.

AD-A075 406/9 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Male and Female Soldiers' Beliefs about the 'Appropriateness' of Various Jobs for Women in the Army.
Technical paper,
Joel M. Savell, John C. Woelfel, Barry E. Collins, and Peter M. Bentler. Aug 79, 26p Rept no. ARI-TP-352

This research (1) documented the expanding role of women in the U.S. Army and (2) collected evidence regarding one aspect of the reaction which soldiers in 1974 may be viewed as having had to this expansion--specifically, the extent to which soldiers at that time believed certain jobs were 'appropriate' for women and the extent to which these beliefs were related to such things as military rank, sex, length of service, and expectation of leaving the army before retirement. To obtain data on the expanding role of women in the Army, we examined the appropriate Army records. To obtain data on soldier's beliefs about job appropriateness, we examined responses to 24 items from a larger set of items included in a questionnaire we administered in 1974 to approximately 800 male and female soldiers (both officers and enlisted) at three CONUS installations.

AD-A075 409/3 PC **A02**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Relationship between Officer Duty Performance and Certain Measures of Potential.
Technical paper,
Arthur C. F. Gilbert. Jul 79, 24p Rept no. ARI-TP-371

As part of on-going research on prediction of leader effectiveness, the performance of students in the Army Officer Basic Course (OBC) was measured by the seven scales of the standard Officer Evaluation Battery, OBC final grades, and peer ratings made halfway through the course and at the end of the course. Later duty performance was assessed by the standard Officer Efficiency Report and the special-purpose Performance Evaluation Form. Statistical correlations indicated that duty performance was predicted best by final peer ratings and next best by grades, both in general and for personnel in noncombat arms branches. For combat arms personnel, however, final peer ratings and ccurse grades appeared about equally predictive. These findings confirm other research on the value of peer ratings. (Author)

AD-A075 410/1 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
An Application of Tactical Engagement Simulation for Unit Proficiency Measurement.
Interim rept.,
C. Mazie Knerr, Robert T. Root, and Larry E. Word. Jul 79, 29p Rept no. ARI-TP-381

The need for methods of measuring team and unit proficiency, and the lack of knowledge in this area are widely recognized. Team performance measurement difficulties are fundamental problems in unit proficiency diagnosis and training evaluation, in both military and civilian settings. Existing Army combat unit performance measurement techniques depend largely on judgmental data. A tactical training system, called tactical engagement simulation (ES), uses objective, accurate casualty assessment that offers a potential means of measuring team performance in combat training. Objective casualty assessment provides the primary measures of team proficiency, such as casualty exchange ratios and mission accomplishment. This report reviews application of ES to unit measurement, with emphasis on lessons learned while validating ES procedures for armor units and while developing ES for armored cavalry units. (Author)

AD-A075 412/7 PC **A04**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Retention of Basic Soldiering Skills.
Research rept.,
Joyce L. Shields, Stephen L. Goldberg, and J. Douglas Dressel. Sep 79, 72p Rept no. ARI-RR-1225

Field Artillery Training Center (FATC) evaluators tested soldier's performance on twenty basic common tasks. The sample included who were completing entry-level training and soldiers who has completed this entry training during the previous 12 months. Training Center evaluators rated task performance 'GO' or NO GO' for each task step and for the task as a whole. Tasks varied in the rate at which the percent 'GO' declined since training. Three factors accounted for most of the differences in retention: (1) number of task steps, (2) order of original training, and (3) the presence or absence of subtasks. Soldiers can perform most task steps. The steps that are forgotten tend to be those that are not suggested by the previous sequence of steps or by the equipment. Commanders can use the research results to determine the relationship between soldier proficiency and time since training. Commanders can schedule training to maintain desired levels of proficiency in critical skills. The eventual research goal is to develop guidelines for determining which tasks require frequent training and which tasks can be maintained at high proficiency for long periods without practice. (Author)

AD-A075 414/3 PC **A08**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Training Battalion Command Groups in Simulated Combat: Identification and Measurement of Critical Performances.
Technical paper,
Ira T. Kaplan, and Herbert F. Barber. Jun 79, 170p Rept no. ARI-TP-376

The behavior of 23 battalion command groups was investigated in a simulated combat environment provided by the Combined Arms Tactical Training Simulator (CATTS). Thirteen mechanized groups performed a covering-force operation followed by an attack, and 10 nonmechanized groups performed a defense and an attack. Their performance was rated on items derived from the subtasks of the battalion command group ARTEP (Army Training and Evaluation Program). Fifteen subtasks were identified as critical, because they or their elements were both low rated and highly correlated with ratings of overall effectiveness.

AD-A075 416/8 PC **A04**/MF **A01**
Naval Postgraduate School Monterey CA
Data Analysis of the Teaching Award Ballots.
Technical rept.,
Robert R. Read. Jul 79, 58p Rept no. NPS-55-79-013

The report studies the data and procedures used to select the recipient of the Award for Excellence in Teaching. Several biasing features in the data summaries and record keeping are uncovered. A new scoring system is proposed and an improved data processing system is detailed. A data monitoring system is proposed which includes sensitivity analysis of the scoring as the values of arbitrary input quantities are varied. (Author)

AD-A075 421/8 PC **A02**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Simulating Various Moon Illumination Levels with Light-Attenuating Devices (LADs).
Technical paper,
Paul R. Bleda. Jul 79, 23p Rept no. ARI-TP-374

To reduce the problems of safety, logistics, and evaluation inherent in training at night, the Army Reseacrch Institute has developed experimental light-attenuating devices (LADs) that simulate night visual conditions during the day. Single-density or bidensity lenses can be fitted to existing facemasks and used to conduct certain night training operations during the day with little reduction in effectiveness. LADs were used experimentally in training and testing night rifle marksmanship during basic Army training at Fort Jackson, S.C. Filter densities effectively approximated night illumination with a full moon, a quarter moon, and a new moon; trainees using LADs performed as well as trainees performing under actual night codnitions. (Author)

AD-A075 422/6 PC **A04**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA

Field Evaluation of the Combat Commander's Guide to Aerial Surveillance and Reconnaissance Resources.
Technical paper,
Uldi Shvern. Jul 79, 52p Rept no. ARI-TP-380

This research evaluated the Combat Commander's Guide to Aerial Surveillance and Reconnaissance Resources on its usefulness, accuracy, clarity, and completeness. The individual sections of the Commander's Guide were judged to be more useful than the document as a whole. Tis seemingly paradoxical result was obtained with both the structured rating scales and the open-ended comments. Raters considered the Commander's Guide to be more suitable for the G2/S2 than for the battalion or brigade commander. Raters' comments concerning possibly excessive detail for a commander's needs are consistent with this finding. Reference to specific AS and R assets are outdated in many instances. Rapid changes in the AS and R area dictate frequent revision of any publication that refers to specific equipment. The anticipated frequency of use of the Commander's Guide would increase greatly during wartime. If the Commander's Guide is revised, fundamental restructuring would be required to achieve high use rates by commanders during peacetime conditions. A consideration of the type of AS and R information that commanders are able and willing to use, as opposed to what they should ideally use, would be required. Unless the user has become familiar with the Commander's Guide, its effectiveness in an emergency is unlikely.

AD-A075 423/4 PC **A04**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
REALTRAIN Validation for Rifle Squads III: Tactical Performance during Movement-to-Contact.
Research rept.,
Thomas D. Scott, James H. Banks, Guthrie D. Hardy, Jr., and Robert H. Sulzen. Jul 79, 57p
Rept no. ARI-RR-1213
See also report dated Mar 79, AD-A069 957.

A field experiment was carried out to determine the relative effectiveness of REALTRAIN, an engagement simulation training system, and conventional training. Rifle squads were given a tactical pretraining test, 3 days of training using either REALTRAIN or conventional methods, a posttraining test, and finally a series of tactical exercises in which REALTRAIN and conventional squads opposed one another. Performance during the movement-to-contact was shown to be highly correlated with subsequent performance during the attack. Consistent with earlier findings on tactical performance during contact and on mission accomplishment and casualty exchange, REALTRAIN was shown to be more effective than conventional field training in the training of infantry rifle squads. (Author)

AD-A075 425/9 PC **A07**/MF **A01**
Gibboney (Richard A) Associates Inc Kensington MD
The Application of Duty Modules to the Front-End Analysis of the Command and General Staff College Regular Course.
Technical rept.,
M. Reid Wallis. Dec 78, 142p ARI-TR-78-B16
Contract DAHC19-78-C-0009

The purpose of this research was to test the hypothesis of a 1977 C and GSC student thesis (Norris and Robbins) that Duty Modules would be useful tools for a front-end analysis of the C and GSC regular course curriculum. This was to be a pilot or prototype evaluation to see whether the hypothesis is worth pursuing further. The 'Battle Captains' special one-week course for command designees and the 'High-Level Staff Application' elective course for officers anticipating assignments to staffs above the corps level were used in the prototype study. (Author)

AD-A075 429/1 PC **A05**/MF **A01**
Kinton Inc Alexandria VA
Development of Small Combat Arms Unit Leader Tactical Training Techniques and a Model Training System.
Research rept. 15 Jan 74-31 May 78,
Edgar L. Shriver, Donald R. Jones, David L. Hannaman, Glenn R. Griffin, and Robert H. Sulzen. Jul 79, 79p ARI-RR-1219
Contracts DAHC19-74-C-0025, DAHC19-75-C-0030
Sponsored in part by Contract DAHC19-76-C-0024.

This research developed simulation techniques for training small-unit leaders in tactical decisionmaking while minimizing troop participation. Basic instructional principles underlying engagement simulation were used to construct a mapboard game abstraction of field exercises. The game was a two-sided, free-play map exercise for teaching infantry tactics to platoon leaders. As originally conceived, junior officers could play the game to learn tactical skills which they would later apply during REALTRAIN exercises with troops. The research summarized in this report has produced (a) an infantry squad/platoon level mapboard game for two-player or multiplayer use; (b) an infantry squad/platoon level field opposition exercise; and (c) a combined arms platoon/company level mapboard game. Separate documents are available on each of the three training techniques.

AD-A075 430/9 PC **A03**/MF **A01**
Human Resources Research Organization Alexandria VA
A Pilot Study of Army Recruiters: Their Job Behaviors and Personal Characteristics.
Technical rept.,
Warren R. Graham, George H. Brown, William L. King, Lenore White, and Mark D. Wood. Mar 79, 50p ARI-TR-79-B2
Contract DAHC19-73-C-0004

The objective of the research was to develop hypotheses concerning the personal characteristics and job behaviors associated with recruiter success. Based on the self-description data, few characteristics were significantly related to production records. Among the significant findings were the following: (1) High producers were less likely than low producers to cite 'independence' as a source of job satisfaction. (2) High producers were more likely than low producers to complain about their long hours of work. (3) High producers more often than low producers mentioned the use of Pre-Induction Physical(PIP) cards and mail-outs as prospecting techniques that they had found successful. (4) High producers less often admitted communication problems. (5) High producers were less likely to describe themselves in terms that were coded as 'not irritable,' and 'empathetic'. The responses made by the subjects in describing a successful and an unsuccessful recruiter they had known appeared to reflect sterotypical notions of what constitutes a good and a poor recruiter. The usefulness of these opinions for recruiter selection is considered to be marginal. A number of idiosyncratic prospecting and selling techniques were mentioned that might be worthy of more widespread utilization (e.g., cultivating drivers' license examiners or bowling alley managers as centers of influence). A number of complaints regarding recruiter management practices were noted, some of which might merit command attention.

AD-A075 431/7 PC **A05**/MF **A01**
Human Resources Research Organization Alexandria VA
Development and Implementation of a Performance Based Training and Evaluation System for the Combat Arms.
Technical rept.,
Hilton M. Bialek, and Mark Brennan. May 79, 76p ARI-TR-79-B4
Contract DAHC19-76-C-0010

This report describes the third year effort of a three-year project, the objective of which was the development and experimental implementation of a system for providing individual skill training in an infantry unit. In this chapter, as background, we will briefly review the first two years of the developmental activities of the project and follow that with a summary description of the system design. (Author)

AD-A075 432/5 PC **A06**/MF **A01**
Human Resources Research Organization Alexandria VA
Survey of User Attitudes Towards Army Training Literature.
Research memo.,
Morris Showel, and Mark F. Brennan. Oct 78, 124p Rept no. HUMRRO-RM-78-14
Contract DAHC19-73-C-0051

To achieve an effective fighting force, the Army maintains an extensive training system. Officer training places emphasis on formal school training. Formal school training also provides enlisted personnel initial exposure to the principles of soldiery in Basic Combat Training (BCT). The training prepares soldiers to function at an apprentice level in a Military Occupational Specialty (MOS), on the basis of either Advanced Individual Training (AIT) at a training center or training at an Army branch school for more technical MOSs. Subsequent training of individual enlisted personnel is carried out largely within the unit to which personnel are assigned. Unit 'schools' provide varied training in the context of the unit; leadership training for noncommissioned officers (NCO) is usually provide in this manner. Training is also provided within the unit to combine the skills of individuals into effectively functioning units. During unit training--Basic Unit Training, Advanced Unit Training, and Operational Readiness Training--enlisted personnel learn to function as a unit, and officers gain experience in leading troops and in the exercise of command and control procedures.

AD-A075 452/3 PC **A02**/MF **A01**
Military Academy West Point NY Office of the Director of Institutional Research
Characteristics of the Class of 1983,
John W. Houston. Sep 79, 21p Rept no. 79-013

This report presents the biographical characteristics and achievements of the 1,398 new cadets who entered the United States Military Academy in the Class of 1983. (Author)

AD-A075 461/4 PC **A03**/MF **A01**
Yeager (Robert F) Champaign IL
Computer-Based Electronics Maintenance Training: Description of Lessons.
Final rept. Jul 78-Jan 79,
Robert F. Yeager, and Zita M. Simutis. Sep 79, 48p ARI-RP-79-10
Contract MDA903-78-M-AA25

A series of computer-based lessons were developed on the University of Illinois PLATO System for use in research in game-based training. These lessons provide instruction and practice in reading logic symbols, logic diagrams, and electronics troubleshooting. The purpose of this report is to describe the available lessons and management routines to interested instructors and trainers of electronic maintenance. (Author)

AD-A075 464/8 PC **A04**/MF **A01**
General Research Corp McLean VA
An Experimental Evaluation of a Tactical Game for Company Level Training.
Technical rept.,
Elmo E. Miller, and James M. Bachta. Jul 78, 75p ARI-TR-78-B12
Contract DAHC19-75-C-0009

The purpose of this report is to document the results of an experimental evaluation of the Dunn-Kempf game, which is a company level board game for exercising command functions. The objectives of the evaluation were to develop a means of measuring performance on the game, to determine what people learn from the game, and to determine which method of playing it ('learning strategy') is most effective. Methods, materials and procedures were developed during January through May, 1977, and the experimental company teams were trained during May-July 1977. (Author)

AD-A075 465/5 PC **A07**/MF **A01**
Human Sciences Research Inc McLean VA
Improved Army Training and Evaluation Program (ARTEP) Methods for Unit Evaluation. Volume V. Analysis of Alternative Training Settings.
Final rept. 31 Jan 78-30 Apr 79,
M. Dean Harvon, Leslie H. McFarling, Howard Hill, and Robert G. Wanschura. Apr 79, 149p HSR-RR-79/3-GE, ARI-TR-79-A23
Contract DAHC19-77-C-0001
See also Volume 4, AD-A075 470.

This study analyzed alternative training settings available to battalion training managers for the conduct of training battalions and their elements

within ARTEP. Nine settings were selected for study: conventional field exercises, engagement simulation field exercises (REALTRAIN and MILES), battalion command/staff battle simulations, CATTS, CAMMS, Pegasus, company/platoon battle simulations, Dunn-Kempf and SCUE, tactical exercises without troops (TEWT) and Command Post Exercises (CPX). Each setting was narratively described on 35 dimensions, including scenarios, presentation of tasks to participants, ARTEP 71-2 missions/tasks exercised by each setting, adminstrative personnel and resource requirements, and capability for performance measurement/diagnosis. Settings were organized into two groups: field exercises and battle simulations. Comparisons were made between and within clusters to determine advantages and limitations of settings in the battalion training environment. Factors affecting the training value of all settings are discussed. Example sequences and combinations of settings are presented for different battalion elements. Primary audiences are researchers, TRADOC/FORSCOM personnel responsible for collective training policy, and battalion training managers. (Author)

AD-A075 466/3 PC **A10/MF A01**
Human Resources Research Organization Alexandria VA
On-Line Authoring Aids for Instructional Design.
Final rept.,
Russel E. Schulz, Nancy Hibbits, Harold Wagner, and Robert J. Seidel. Jul 79, 205p HUMRRO-FR-ED-77-24, ARI-TR-387
Contract DAHC19-76-C-0041, ARPA Order-2887

The purpose of the research was to conduct a development and feasibility demonstration of on-line, query-based authoring aids for selected blocks of the Interservice Procedures for Instructional Systems Development (IPISD) model. The model indicates techniques and procedures for the development and conduct of interservice training. The blocks selected from the IPISD model for this demonstration were Block II.2, Develop Tests, and Block III.4, Develop Instruction. The research was designed to provide authoring aids ('How to do it' guidance) for developmental activities identified in the blocks. (Author)

AD-A075 468/9 PC **A07/MF A01**
Applied Science Associates Inc Valencia PA
The Causes of Attrition in Initial Entry Rotary Wing Training.
Technical rept. 1 Aug 77-Mar 78,
Thomas K. Elliott, Reid P. Joyce, and Robert L. McMullen. Jan 79, 150p ARI-TR-79-B1
Contract DAHC19-77-C-0038

In recent years Initial Entry Rotary Wing Training (IERW) has had a relatively high attrition (washout) rate. While current figures show a reduction in the rate, losses still represent a large dollar investment in the student in training and in allocated but unused resources when the student washes out or resigns. In addition, setbacks, some of whom eventually wash out, add to training costs. A study of the causes of washouts and setbacks which identifies factors not currently incorporated in student selection and recruitment would provide the basis for improving student input. This improvement would increase throughput and reduce training cost per graduate. (Author)

AD-A075 470/5 PC **A13/MF A01**
Human Sciences Research Inc McLean VA
Improved Army Training and Evaluation Program (ARTEP) Methods for Unit Evaluation. Volume IV. Guidance for Planning and Conduct of Company-Level Field Exercises. Engagement Simulation Technical Area.
Final rept. 31 Jan 78-30 Apr 79,
M. Dean Havron, Timothy J. McCullough, Leslie H. McFarling, and Robert G. Wanschura. 30 Apr 79, 276p HSR-RR-79/2-GE, ARI-RP-79-7
Contract DAHC19-77-C-0001
See also Volume 5, AD-A075 465.

This document provides guidance for exercise planners and evaluator/controller teams responsible for planning and conducting platoon and company tank/mechanized infantry field exercises. It contains a command planning guide that addressses basic ARTEP training/evaluation principles, choice of missions, scenario development, evaluator/controller selection and training, sequences of exercise events and monitoring of the evaluator/controller team. Also included is a Program of Instruction for evaluator/controller training. Fifteen separate lesson plans cover evaluator/controller duties, exercise planning, exercise control and communication, simulation, performance observation and evaluation, exercise rehearsal, terrain reconnaissance, conduct of critiques, and data analysis/report preparation. Each lesson includes example lesson narratives, graphics and trainee handouts. Another section of the document presents the rationale for the content of the command planning guidance and program of instruction. A final section describes the field testing and revision of earlier guidance that led to the guidance in the present document. Primary audiences for this document are researchers, TRADOC personnel responsible for tank/mechanized infantry collective training/evaluation and tank/mechanized infantry unit training managers seeking additional guidance in exercise planning and evaluator/controller training. (Author)

AD-A075 472/1 PC **A04/MF A01**
Iowa Univ Iowa City Div of Educational Psychology
Theory and Practice for the use of Cut Scores for Personnel Decisions.
Research rept. 1 Sep 78-1 Sep 79,
David T. Chuang, James J. Chen, and Melvin R. Novick. Sep 79, 51p Rept no. TR-79-6
Contract N00014-77-C-0428

This paper provides necessary and sufficient conditions for the existence of a cut-score for arbitrary utility functions. Classical theories of monitone likelihood ratios and stochastically increasing distribution are extended to provide the necessary theory of monitone posterior ratios, which provides a sufficiency condition. Necessity is studied in individual cases. In general only modest sample sizes and avoidance of situations with extreme cut-scores is necessary. (Author)

AD-A075 496/0 PC **A09/MF A01**
Army Infantry School Fort Benning GA
Personnel Handbook.
1st edition.
1966, 182p

This handbook provides information for students of the United States Army Infantry School concerning the S1 (Adjutant) staff functions and procedures applicable in Infantry, Airborne Infantry, Mechanized Infantry battalions and brigades. (Author)

AD-A075 498/6 PC **A04/MF A01**
Air Force Occupational Measurement Center Randolph AFB TX
Tactical Air Command and Control Career Ladder, AFSC 275X0.
Final rept.,
Michael D. Hill. Sep 79, 54p

The data used in the compilation of this report were collected through the administration of job inventory booklets to all DAFSC 275XO personnel Air Force-wide. The survey results were based on responses from 380 of the 545 275X0 personnel assigned worldwide, or 70 percent of the total worldwide career ladder population. Overall, the career ladder structure was very homogeneous. All three major job clusters identified, Junior Tactical Air Command and Controllers (TACCs), TACCs, and TACC NCOICs, performed a common core of technical tasks. The two independent job types identified, TACC Superintendents and Set Up Technicians, differed from the major clusters in that they performed more specialized or unique jobs.

AD-A075 583/5 PC **A09/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
Productivity: A Function of Skill.
Master's thesis,
Bruce D. French, and Robert P. Steele. 7 Sep 79, 196p Rept no. AFIT-LSSR-11-79B

Two major findings resulted from this research: (1) the relative productivities of the different skill levels of aircraft maintenance personnel were measured. Specifically, the procuctivity of the three-level, of the five-level, and of the seven-level were compared and the relative differences determined; and (2) the Maintenance Data Collection (MDC) system may be questionable as a source of useful management information. The research looked at the productivity of the seven, five, and three-level worker, 431x1 AFSC, at three F-4E bases. Data was collected over a six-month period. Analysis was accomplished using multiple regression and path anlaysis. The results were surprisingly consistent with the author's forecasts. The authors conclude that it is possible to determine relative productivity factors for various skill levels using data from MDC. Their recommendations include a further investigation and improvement of MDC and a feasibility study of the application of the research to Air Force manpower problems. (Author)

AD-A075 585/0 PC **A08/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
The Effect of Air Traffic Control Experience Levels on Quality of Service.
Master's thesis,
James R. Rhoades, and Charles E. Samuel. 7 Sep 79, 159p Rept no. AFIT-LSSR-26-79B

The median experience level of Air Force air traffic controllers has decreased significantly over the past five years. The purpose of this thesis is to determine what impact, if any, this high turnover rate has had on the quality of ATC services provided as measured by Hazardous Air Traffic Reports (HATR). Trend analysis, proportions, multiple linear regression, and tests on the differences of the population means were used in the analysis of the total, facility, and local experience levels of the controllers cited as cause of the HATRs. The impact of weather, traffic volume, equipment failure, the presence of a crew chief, and the presence/absence of a trainee were also examined. The data base consisted of all HATRs filed from January 1975 to April 1978. The findings were: (1) that the number of HATRs received by controllers is decreasing, (2) the mean experience levels of controllers is not changing significantly, and (3) that a controller is most vulnerable to receive a HATR in his first two years or less on station, regardless of his previous facility and total experience. (Author)

AD-A075 592/6 PC **A08/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
Behavioral Factors Affecting the Integration of Women into Air Force Craft Skills.
Master's thesis,
Gregory S. Caron, and Larry W. Emmelhainz. Sep 79, 168p Rept no. AFIT-LSSR-14-79B

This research analyzed data collected during February 1977 from 1730 Air Force women in traditionally all male AFSCs. The objective was to determine the behavioral factors which affected socialization into the job, and to define in detail the stereotypes and job socialization factors identified. The analysis showed that these women generally rejected role stereotypes, considered themselves capable of working effectively in the craft skill AFSCs, and strongly indicated they were treated fairly by their supervisors and were accepted by their male coworkers. They also rejected the historical male/female traits stereotype. Although satisfied with the USAF, the women were equally divided in their satisfaction/dissatisfaction with their AFSCs. The analysis also showed a relationship between role stereotypes and job socialization. Although the women appeared to perceive little difficulty working in the craft skills, their capability to maintain high surge rates under wartime conditions remains untested. (Author)

AD-A075 593/4 PC **A07/MF A01**
George Washington Univ Alexandria VA Human Resources Research Office
Work Program. Fiscal Year 1969 for The Department of the Army. Research and Development in Training, Motivation, and Leadership.
Jan 69, 129p
Contract DA-44-188-ARO-2

No abstract available.

AD-A075 595/9 PC **A03**/MF **A01**
George Washington Univ Alexandria VA Human Resources Research Office
Report on Technical Advisory Services. Fiscal Year 1965.
Dec 65, 29p

No abstract available.

AD-A075 596/7 PC **A03**/MF **A01**
George Washington Univ Alexandria VA Human Resources Research Office
Report on Technical Advisory Services. Fiscal Year 1964,
J. C. Rupe. Oct 64, 29p

The HumRRO annual report of Technical Advisory Services (TAS) is published to provide the reader with information about the scope, variety, significance, and extent of the services and to serve HumRRO and appropriate Army agencies as a basis for future program planning and budgeting. TAS is an information-providing activity usually initiated in response to a consumer request occurring under either of the following conditions: (1) If a reliable basis for providing the information exists within the body of relevant knowledge. (2) If only trend information exists, but the time available to either the responding research group or the potential user does not permit initiation of research.

AD-A075 597/5 PC **A03**/MF **A01**
George Washington Univ Alexandria VA Human Resources Research Office
Report on Technical Advisory Services for Fiscal Year 1963,
J. C. Rupe. Mar 64, 30p
Contract DA-44-188-ARO-2

This report consists of tabular presentations of Technical Advisory Services (TAS) activities and Action Briefings during the Fiscal Year (FY) 1963.

AD-A075 598/3 PC **A07**/MF **A01**
Human Resources Research Organization Alexandria VA
Work Program. Fiscal Year 1972 for The Department of the Army. Research and Development in Training, Motivation, and Leadership.
Jul 71, 126p
Contract DAHC19-70-C-0012

Activities in the HumRRO Work Program for the Department of the Army for FY 1972 have been grouped into six major Research Areas. These groupings, although not definitive or mutually exclusive, serve to indicate the nature of HumRRO work in relation to needs arising in major Army activities; they also serve to emphasize the interrelationships among HumRRO studies. A tabular summary of the Work Program showing the location, category, and amount of effort in each Research Area is presented in Section III, pages vi-vii. Work Units are indicated by code names, and Exploratory Research and Basic Research problems are identified by numbers. A total of 74.26 'basic man-years' has been allocated to the activities shown in the chart.

AD-A075 599/1 PC **A08**/MF **A01**
George Washington Univ Alexandria VA Human Resources Research Office
Proceedings of United States Army Military Educational Advisors' Conference, Washington, DC, 28 - 30 January 1958.
Apr 58, 168p

No abstract available.

AD-A075 600/7 PC **A03**/MF **A01**
Army Combat Developments Command Personnel and Logistics Systems Group Fort Lee Va
Personnel Offensive (Phase I). Executive Summary.
18 Sep 71, 33p

An assumption was made that incoming personnel during the 1970's will differ in social and personal characteristics from persons who entered the Army in earlier decades. It was further assumed that because of the differences in entering personnel, it would be necessary to modify Army policy and doctrine regarding personnel management and administration. The objectives of this study are to: (1) Describe the changing characteristics of incoming military personnel during the 1970's. (2) Determine the effects of the changing characteristics of incoming personnel in the 1970's upon Army personnel policy and doctrine. (3) Propose alternative Army leadership techniques, personnel policies, and doctrine regarding troop leadership, personnel management and administration. (4) To identify areas where sufficient information is lacking and describe the requirements for Army studies or research in these areas.

AD-A075 604/9 PC **A04**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Field Test of Techniques for Tactical Training of Junior Leaders in Infantry Units (Project EFFTRAIN).
Technical rept.,
Robert T. Root, John F. Hayes, Larry E. Word, Edgar L. Shriver, and Glenn R. Griffin. Jul 79, 75p Rept no. ARI-TR-79-A21

This field test has three research objectives: (1) to conduct a limited comparison of units trained using new tactical training techniques with similar units who received conventional combat training, (2) to determine the relative value of 'process' versus 'product' performance measures in the measurement of unit proficiency, and (3) to determine whether these new training techniques could be 'handed off' to the using unit with only written documentation. One infantry company was trained for 4 weeks with an experimental EFFTRAIN training package--consisting of a board game, field opposition exercises for leaders, and infantry REALTRAIN exercises--and then its performance was compared with that of a control company that conducted training of its own choice for the same period. The performance of the two companies was compared by having elements of each compete against one another in REALTRAIN exercises. To determine how much proficiency was achieved by the experimental group (EFFTRAIN), the criterion situation was set up to give an increasing numerical advantage to the control group (Non-EFFTRAIN).

AD-A075 606/4 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Tactical Engagement Simulation Training: A Method for Learning the Realities of Combat.
Technical paper,
Robert T. Root, C. Mazie Knerr, Angelo A. Severino, and Larry E. Word. Aug 79, 28p Rept no. ARI-TP-370

Training of combat arms units requires a different approach from conventional instructural system development (ISD) practices. From a systems perspective, unit performance may be more than the sum of individual performances. In battle, subunits interact, and unit and subunit behavior is contingent on the behavior of an intelligent adversary. Conditions that initiate complex combat behavior can rarely be specified in advance. The idea of 'emergent' rather than 'established' situations provides a framework for considering situationally determined unit behavior. The empirical approach called engagement simulation involves the detailed observation and recording of 'naturally occuring' tactical behavior in what military experts agree is a valid, if incomplete, representation of combat. The simulation procedures provide for data collection and analysis.

DOE/AD-0027/1 PC **A03**/MF **A01**
Department of Energy, Oak Ridge, TN. Oak Ridge Operations Office.
Comparison of Compensation Paid Scientists and Engineers in Research and Development. DOE National Survey of Compensation, 1978 Data.
Mar 79, 32p

This study compares the characteristics and compensation of DOE contractor-operated laboratories with those reported in the 1978 National Survey of Compensation. Total survey representation increased this year. Findings are presented with respect to education levels, management levels, age distribution, field of highest degree, and compensation levels. Salary levels and trends are examined at some length. 20 figures, 5 tables. (ERA citation 04:049423)

DOE/IR-0053 PC **A04**/MF **A01**
Department of Energy, Washington, DC.
Nuclear Engineering Enrollment and Degrees, 1978: Enrollments, Fall 1978, Degrees Granted, July 1966--June 1978.
Aug 79, 69p

This report presents the results of the eighth annual survey of Nuclear Engineering Enrollments and Degrees. Each year the survey is sent to institutions offering degrees in nuclear engineering or other engineering disciplines with nuclear engineering options. Although the number of institutions included may vary from year to year, historical information about degrees granted since July 1966 has been collected for all institutions. Over the past few years there have been significant perturbations in the supply of new engineers with nuclear expertise caused by many factors, such as the general decline in engineering enrollments, concern about involvement in nuclear activities, and uncertainty about a nuclear power future. This series of nuclear engineering enrollment and degree surveys has charted the changes in the supply of professional nuclear personnel and assisted planners and educators alike in preparing to provide for this needed energy resource. Data are presented on enrollments and degrees, placement of graduates, women and minorities, foreign nationals, and regional distribution. 1 figure, 11 tables. (ERA citation 04:051788)

HRP-0026418/4 Not Available NTIS
Statewide Program to Teach Nurses the Use of Fetal Monitors.
Mary F. Haire, and Frank H. Boehm. 1978, 3p
Pub. in Jnl. of Obstetrical Gynecological Neonatal Nursing v7 n3 p29-31 May-Jun 78.

A program initiated in 1974 by the Department of Obstetrics and Gynecology of the Vanderbilt University School of Medicine to teach nurses the use of fetal monitors is outlined. In the original program, a traveling nurse directed workshops to train physicians and nurses in the use and care of the monitoring machine; the program was later expanded to the whole State (36 hospitals) by a National Foundation/March of Dimes grant. Teaching methods have encompassed demonstration of care and use of equipment; slide presentations on reasons for monitoring, vocabulary definitions, differences in internal and external monitoring, and data interpretation; review of tracings from hospital files; and group discussions. The major difficulty is that one nurse has to cover a wide area, so that hospital training needs are not met and followup sessions are impossible. It is recommended that this educational program be the responsibility of Level III hospitals under the proposed perinatal health care regionalization system and that the program be expanded to include fetal maturity testing, stress testing for antepartum diagnosis of fetal distress, care of pregnant women with complications, and programs for teaching patients. The need for continuing education services offered by medical centers to surrounding hospitals is stressed. One table and a short bibliography are included.

HRP-0026476/2 Not Available NTIS
Maryland Univ. at Baltimore. School of Nursing.
Identification of Learning Needs.
Frances P. Koonz. 1978, 6p
Pub. in Jnl. of Continuous Education in Nursing v9 n3 p6-11 1978.

Types of learning needs pertinent to continuing nursing education and methods of need identification are discussed. The individual nurse must recognize shortcomings, make needs known to appropriate authorities, and take action, while continuing education programs determine individual needs by interviews and projective or completion questionnaires. Educators must also distinguish between real educational needs and felt needs better met by other departments. Continuing educational needs of organizations are best met through quality assurance programs including concurrent monitoring and retroactive patient chart audit. Administrative needs of nurses are best filled through cooperation with other institutions. A continuing education advisory committee with diverse geographical and clinical representation may serve several purposes, such as helping to distinguish real from felt needs and assisting in

evaluation. New nursing needs generated by changes in the medical care system are discussed. Changes in the nurse's role are effected by legislation, national health insurance, specialized work settings (e.g., occupational or college health programs), and new research findings. Continuing education program establishment requires identification of priorities, cooperative planning with other institutions, and regional planning. It is emphasized that continuing educators must keep abreast of events in undergraduate and graduate education and collaborate with all levels of educators in remedying deficiencies.

HRP-0026644/5 Not Available NTIS
College of Physicians and Surgeons, San Francisco, CA. School of Dentistry.
Dental Education in the United States, 1976. Part 1. Methodology.
David W. Chambers. 1978, 6p
See also Part II, HRP-0026645; Part III, HRP-0026646.
Pub. in Jnl. of Dental Education v42 n5 p232-237 May 78.

Methods used in planning, executing, and interpreting the results of the dental school curriculum survey are described. The study included a review of curriculums in U.S. dental schools and an opinion survey of graduates of the classes of 1971, 1974 and 1975. Advisory panels were formed to report on subject matter being taught in basic sciences, clinical sciences and behavioral/social sciences, and survey coordinators were appointed for each institution surveyed. Successive development of the survey and study was an unusual feature because it enabled the results of preceding activities and repeated input from all parties concerned to be utilized in subsequent steps. The reliability and validity of the study methodology and results are assumed from the inclusiveness of data obtained and the breadth of the analysis by the advisory panels. However, the reliability and validity of the study results are seen as dependent on the purposes for which they are used. Appropriate uses and possible misuses are described. The results of the survey have already provided a standardized format for reporting dental curriculum information and a data base which can serve as a benchmark against which to gauge future trends and progress.

HRP-0026646/0 Not Available NTIS
Connecticut Univ. Health Center, Farmington. School of Dental Medicine.
Dental Education in the United States, 1976. Part III. The Recommendations.
Harald Loe. 1978, 3p
See also Part I, HRP-0026644; Part II, HRP-0026645.
Pub. in Jnl. of Dental Education v42 n5 p243-245 May 78.

Recommendations for improving dental school curriculums are discussed. Besides organizational and management changes, the recommendations relate to addition of coursework in pharmacology, hospital dentistry, surgery, sedation/anesthesiology, nutrition, emergencies, physical evaluation, orthodontics, practice management, clinical behavioral science, and basic medical science. The focus of discussion is on the inappropriateness of these recommendations in light of the perceived need in dental education to simplify and streamline the curriculum. The fundamental issues identified are constructing and integrating objectives for the curriculums of predental, predoctoral, postdoctoral, and continuing education; setting minimum standards; establishing a time course for dental education; and optimum placement of basic and clinical science courses. Rather than adding on management mechanisms and coursework to an already overcrowded and inappropriate curriculum, it was proposed that the total curriculum be reconsidered and revised according to the basic objectives of dental science. Attention to technological progress, content of basic medical and behavioral science material, and increased dental research is recommended. It is proposed that dentistry become a clinical specialty of medicine, rather than a separate profession, so that integration of the curriculum can occur without waste of time and materials.

HRP-0027117/1 Not Available NTIS
Columbia-Presbyterian Medical Center, New York.
Continuing Education for Community Pharmacist -- Medical School Program.
Burton Grebin, Russell S. Asnes, Karin R. Dickinson, and Lloyd F. Novick. 1977, 5p
Pub. in New York State Jnl. of Medicine v77 n11 p1801-1805 Sep 77.

The Department of Pediatrics of Columbia University College of Physicians has been sponsoring a continuing education program for community pharmacists since 1973. The program enables pharmacists to assume more effective roles in health care delivery by updating their knowledge of current medical and pharmacologic practices that are relevant to community needs. The program also focuses on improvement of professional relationships between community pharmacists and consumers, hospitals and physicians. Potential areas of the pharmacist's impact on community health care delivery are defined as counseling of patients, health education, referral, and pharmacologic consultation to physicians. An evaluation of the program indicated that queries from pharmacists about dosage and appropriateness of prescribed medications were increasing significantly. The participating pharmacists have indicated their enthusiastic acceptance and appreciation of the program because of its enhancement of their practice knowledge and professionalism. It is concluded that continuing education is useful in preparing pharmacists for more and better quality activities in delivery of community health care services. Supporting data are included.

HRP-0027373/0 Not Available NTIS
North Carolina Univ. at Chapel Hill.
Research Model for Continuing Education in Nursing.
Jeanne Margaret McNally. 1978, 5p
Pub. in the Jnl. of Continuation in Nursing v9 n4 p33-37 1978.

This model is designed to aid in the development of a statewide plan of continuing education for nurses. Objectives are to identify the demand, to determine goals and needs, to describe available resources, to establish the capacity of the total statewide system to meet determined goals, to identify and analyze alternative systems for meeting goals and their incongruence, and to synthesize the best features of available options and outline a viable statewide program based on regional or area programs. It is assumed in the model that nurse practitioners are involved in continuing education, that continuing education is essential for maintaining competence in nursing practice, and that the continuing education needs of nurses are affected by many factors. These factors encompass changes in the health care delivery system and in licensure laws, increases in the number and variety of health personnel and alterations in their roles and responsibilities, legislative changes, increased demands for health care, greater acceptance of individual accountability, changes in demographic characteristics, advances in health and nursing science, and personal growth and changing career goals. Goals of continuing education pertain to communication, flexibility and responsiveness with regard to learning needs, field testing of nursing knowledge and competence, effectiveness of program offerings, promotion of individual accountability, and awareness of changes in nursing and health care.

HRP-0027602/2 Not Available NTIS
Beth Israel Hospital, Boston, MA.
Program Integrates Operating Room (OR), Professional Nurses' Needs.
Joan M. Weintraub. 1978, 5p
Pub. in Association of Operating Room Nurses Jnl. v28 n3 512ff Sep 78.

Personal and professional growth topics introduced at Beth Israel Hospital in Boston, Mass., to enhance the competency of operating room (OR) nurses are explored. The surgical suite at the hospital includes 11 OR's and a cystoscopy room. It is staffed by approximately 40 registered nurses who range in OR experience from 0 to 15 years and who have been educated in associate, baccalaureate, and diploma nursing programs. The educational needs of OR nurses are met by educational coordinators, clinical specialists, an inservice instructor, and a research coordinator. Core orientation topics are: introduction to the nursing process; philosophy of primary nursing; principles of infection transmission and prevention of nosocomial infection; religious needs of patients and families; introduction to quality assurance procedures; cardiopulmonary resuscitation; procedure and equipment review; principles of cardiac monitoring; chest physical therapy; respiratory therapy; and introduction to gerontology nursing. All educational programs fall into one of three categories: clinical excellence, professional growth, and personal growth. The goal is to integrate OR educational programs with nursing educational programs throughout the hospital, although this integration effort is affected by such variables as staffing and periodically heavy workloads. It is envisioned that increased expertise and improved communication among OR nurses will result in continuity of patient care.

HRP-0028041/2 Not Available NTIS
Seattle-King County Dept. of Public Health, WA.
Administrator's View of Staff Educational Needs.
Jo McNeil. 1978, 5p
Pub. in Nursing Outlook v26 n10 p641-645 Oct 78.

This article examines public health nursing education from the perspective of a nursing administrator and deals with educational needs, leadership opportunities, and expanded responsibilities of staff, the implications of nursing administration for graduate education, and the need for generalists. The scope of health services is often limited because funding for community programs is designated for specialized services; a large portion of personal health services is devoted to mothers and children. Public health nursing affords many leadership opportunities in various facets of health service delivery. A master's degree in nursing is not necessary to assume administrative positions in community health administration, but expanded responsibilities of nursing are increasingly demanding graduate preparation. In addition to nursing training, administrators need to be aware of community factors affecting health. These include water supplies, septic systems, food and dental services, the epidemiology of disease and chronic disorders, vital statistics, population analysis, occupational health, legality of consent, budgeting, and program evaluation. Family nurse practitioners are needed, and the best approach to their education may lie in a program that combines education and practical experience in the same time period. The importance of preparing and retaining both expanded role nurses and generalists is stressed. Comprehensive health care provided in the community by nurses can serve to meet environmental, social, physical, and psychological needs of patients.

HRP-0028419/0 Not Available NTIS
Teaching Interpersonal Skills.
Marie Farrell, Mary Haley, and John Magnasco. 1977, 4p
Pub. in Nursing Outlook v25 n5 p322-325 May 77.

A course designed to teach interpersonal skills in nursing that is based on sequential learning, evaluation, and student self-reports is described. It was determined that students who enroll in baccalaureate nursing programs need basic communication skills, i.e., the ability to communicate at an effective level and to view oneself as able to help others, and the recognition of one's own feelings and reactions to situations. The course was offered to two small groups of sophomore nursing students. The control group received a course involving lectures and assigned readings. The experimental group was involved in role playing exercises, and in self-pacing, self-instructional videotape vignettes. Vignettes portrayed clients and helpers whose verbal and nonverbal behavior was analyzed. A variety of circumstances was presented by tapes and students had an opportunity to practice the evaluation of communication skills and to compare their perceptions. Tests were administered before and after the experimental technique to assess the impact of the course on behavior. Students' ability to communicate effectively and to view themselves as helping persons were evaluated on a five-point scale. Students in the experimental group communicated better than students in the control group. The sequential learning approach, when used in conjunction with audiovisual materials such as vignette tapes, was effective in improving interpersonal skills.

HRP-0026426/5 Not Available NTIS
Iowa Univ., Iowa City. Coll. of Medicine.
Relating Undergraduate Medical Education to Continuing Medical Education.
Richard M. Caplan. 1977, 3p
Pub. in Jnl. of Medical Education v52 n8 p674-676 Aug 77.

Methods of stimulating undergraduate medical students to continue their educational process after graduation are enumerated. Faculty members are encouraged to demonstrate their own interest in the production of new knowledge by giving occasional talks on lifelong learning, distributing announcements on continuing education, facilitating preceptorships with outstanding practitioners, requiring regular use of journals, and fostering discussion on accreditation, professional standards review organizations, the role of continuing education, medical audits, and other current topics. The need for self-directed inquiry and collaborative learning with colleagues is deemed fundamental to successful adult education. While it is difficult to identify the naturally curious, energetic learner in the student selection process, a positive attitude can be cultivated in a variety of students by such techniques as well-prepared lectures, fair use of tests and test scores, and assignments of reasonable length and of clear relevance. Rewards for good teachers, medical school commitment to continuing education, assessment of community practice, and development of individualized traineeships for practitioners are recommended.

HRP-0028481/0 Not Available NTIS
Regional Emergency Medical Services Council of New York City, Inc.
Corporate Basic Life-Support Program, A Concept in Emergency Health Care Delivery.
Jane E. St.Clair, James N. Oss, and Walter F. Pizzi. 1977, 4p
Pub. in Professional Safety v22 n10 p26-29 1977.

A description is provided of the major elements of a program intended to maximize the lifesaving potential of life-support training in New York City. Generalized media and targeted media are used by the Regional Emergency Medical Services Council of New York City in educating corporations about the availability of special corporate emergency programs. If corporations are interested in the program, a meeting is held with the council's training staff. At that time, particular information is solicited which is used to determine: the number of employees to be trained and their locations; training logistics; course content; and the basic elements of the medical emergency response system. The council and the corporation work together to screen volunteers. The basic program is comprised of 16 to 20 hours of intensive training. After the final training session, the corporate life support system emergency plan is integrated for the individuals trained. Initial results of the program indicate that there is a substantial potential for lifesaving in high-density population areas.

HRP-0028559/3 Not Available NTIS
California Univ., San Francisco. School of Nursing.
Preparing Nurse Leaders for the World of Tomorrow.
June T. Bailey, and Karen E. Claus. 1978, 10p
Pub. in Nursing Leadership v1 n1 p19-28 Jun 78.

A three-course leadership series for nurses was developed in this project at the University of California at San Francisco under a DHEW special training grant. With the overall goal of training nurse leaders, specific objectives were to define leadership, provide instruction in leadership processes to nurses enrolled in graduate programs, provide practice for the development of leadership skills in a controlled and risk-free situation, provide feedback to students regarding their leadership skills, and to provide for the systematic evaluation of leadership techniques taught in the course series relative to performance in the work setting. The leadership curriculum focused on beliefs about teaching and learning, the definition of leadership, structural elements (skills in problemsolving and decisionmaking; in translating power and authority into influence; in managerial functions and human relations; in introspection and self-awareness; in conflict resolution; and in information processing), and grade contracts where students chose assignments to meet their learning needs. Numerous instructional aids were employed, including computers, decisionmaking simulation programs, and standardized and other tests with feedback. Figures provide information on principles of learning and instructional experience, the leadership curriculum, grade contracts and course topics, and contain a grade contract form. A table summarizes computer programs developed and used in the project.

HRP-0028641/9 Not Available NTIS
Texas Univ. Medical Branch at Galveston.
Evaluation of a Pilot School Health Education Program for Asthmatic Children.
Guy S. Parcel, and Philip R. Nader. 1977, 4p
Pub. in the Jnl. of School Health v47 n8 p453-456 Oct 77.

Asthmatic children who participated in an educational program aimed specifically at their condition demonstrated a significant rise in perceived ability to control their own health behavior. Thirteen children, from grades K to 5, participated in weekly 40-minute sessions for 7 months of the school year conducted by a health educator from the department of pediatrics and the school pediatric nurse practitioner. Lessons focused on assisting the children in understanding the concepts related to the nature of asthma, causes of attacks, prevention, and treatment measures. Lessons also dealt with decisionmaking and feelings about asthma. The results revealed that the children as a group became more internal or less external in their perceived source of reinforcement for health behavior. School absences due to asthma and the number of emergency asthma attacks were not affected significantly by the program. Modifications planned as a result of the initial performance evaluation included utilizing a multidisciplinary team to reinforce learning and collecting data from a control group of asthmatic children for comparative purposes.

HRP-0028877/9 Not Available NTIS
California Univ., Los Angeles. Emergency Medicine Center.
Undergraduate Medical Education -- An Evaluation of First Aid and Emergency Medicine Components.
Franklin D. Pratt, and Charles R. McElroy. 1978, 5p
Presented at the 5th Annual ACEP/EDNA Scientific Assembly in San Francisco, Nov 1977.
Pub. in Jnl. of American College of Emergency Physicians v7 n12 p429-433 Dec 78.

To determine the status of undergraduate medical education in first aid and emergency medicine and the amount of change in medical school curriculums, a questionnaire was sent to 114 medical schools. Data were obtained from the 44 responding schools about the school (size, private or public, number of emergency department visits, and staffing of the emergency facility), how and when students were taught first aid and emergency medicine, and information relevant to the process of learning basic and advanced first aid and cardiopulmonary resuscitation (CPR). Only one school did not have an emergency facility available to students. Nearly half of students' supervision was provided by full-time emergency physicians with academic appointments. A basic first aid course modeled after the American Red Cross was not available in 16 of the schools, optional in 20, and required in only 7. CPR was taught in 40 schools. Variable coverage was given to environmental emergencies. Immediate care of head and spinal injuries was studied at all schools, and diagnosis and treatment of many nonsurgical emergencies were taught at most schools. One of the most significant findings of the survey was that over one-third did not teach basic first aid and that almost two-thirds did not teach advanced first aid. The growing importance of emergency medicine as a specialty and the need for appropriately trained individuals are examined. Supporting survey data are provided. Sample questions from the survey instrument are included.

HRP-0029580/8 Not Available NTIS
Values Clarification in Nursing -- Application to Practice.
Diane B. Uustal. 1978, 6p
Pub. in American Jnl. of Nursing v78 n12 p2058-2063 Dec 78.

Ten value clarification strategies, designed to increase the awareness and appreciation of self and to explore selected value conflicts and ethical dimensions in nursing, are described. If nurses do not take the time to examine and articulate their values, they will not be fully effective with patients. Important issues for each nurse to resolve are professional autonomy, membership in professional organizations, licensure based on reexamination, professional accountability and continuing education. No nurse can provide appropriate care without understanding his or her own feelings, attitudes, and values and how these affect responses to people. Values are reflected in specific value judgments; their clarification is a dynamic process. Seven steps in the valuing process are free choice, choice from alternatives, choice after careful consideration of the consequences, satisfaction with a choice, willingness to affirm a choice publicly, choice as part of one's behavior, and repetition of a choice. Value clarification can significantly impact both patient care and patient teaching. The 10 value clarification strategies are concerned with encouraging nurses to think in terms of self, looking at personal and professional patterns, examining feelings about selected issues, using the value clarification process for change, establishing priorities in nurse-patient relationships, exploring ethical dilemmas, and honest professional practice.

N79-32933/0 PC A03/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
A Proposal for the Use of New Parallel Multiplication and Division Algorithms, Modeled after Egyptian and Babylonian Prototypes.
J. Friberg. 1979, 39p CTH-MATH-1979-5

The introduction into the Swedish school system of division algorithm as well as a multiplication algorithm which is as parallel as possible in its written form to the division one is suggested. Ease of comprehension and pedagogical advantages are noted. The fact that the ancient Egyptian algorithms for multiplication and for division were practically identical is cited. A rapid sketch of the history of the algorithms for multiplication and division that have been in use in European and American schools since the fifteenth century and even earlier is then given.

PB80-105398 PC A03/MF A01
Washington Secretary of State, Olympia.
Precinct Election Officer's Guidebook (Washington).
1978, 31p

The report gives precise instructions for precinct election officers in conducting elections at the polls. Applicable statutes are included.

PB80-105596 PC A03/MF A01
Transport and Road Research Lab., Crowthorne (England).
Comparison of On-Road and Off-Road Cycle Training for Children,
Oat Wells, C. S. Downing, and Marie Bennett.
c1979, 31p TRRL-LR-902
Also pub. as ISSN-0305-1293.

The report compares the reactions of children trained on bicycles and practicing on roads with those practicing in play grounds. Pedestrian child training is also evaluated.

PB80-105810 PC A03/MF A01
Transport and Road Research Lab., Crowthorne (England).
Car Driving Before and After Passing the Driving Test,
D. Jenkins. c1979, 38p TRRL-LR-869

A national sample of drivers taking the car driving test during 1974/75 received a postal survey on how they learned to drive, and those 47 percent who passed completed a further postal survey a year later on their mileage and accidents. Nearly everyone (94 percent) had lessons from a driving school, and many had instruction from friends and relatives as well, the average cost of learning coming to L130. Younger drivers did best on the driving test and also had the highest accident rates during their first year. Overall, the accident rate for the whole group of newly qualified drivers was

higher than for experienced motorists particularly at night and possibly also in bad weather. (Copyright (c) Crown Copyright 1979.)

PB80-111859 PC **A03**/MF **A01**
State Univ. System of Florida Sea Grant Program, Gainesville.
State University System of Florida Sea Grant College Program, 1978.
Annual rept. 1 Jan-31 Dec 78,
Tom Leahy, and Billie Lowry. 1979, 44p NOAA-79092705
See also report dated 1977, PB-289 809.

In addition to its regular sections summarizing research and advisory programs, the report presents the highlights of the Sea Grant research on estuaries, the coastal zone and food from the sea.

PB80-112147 PC **A14**/MF **A01**
National Highway Traffic Safety Administration, Washington, DC. Technical Services Div.
Driver Licensing (Revised Edition).
Subject bibliography,
L. Flynn, A. J. Latchaw, A. G. Ogden, and W. J. Tannahill. Sep 79, 321p DOT-HS-805 043, SB-36

The bibliography represents literature acquired since the establishment of the National Highway Traffic Safety Administration (NHTSA) concerning driver licensing and driver licenses. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal Highway Safety Literature and are indexed by a key-word-out-of-context (KWOC) listing, author, corporate author, contract number, and report number.

PB80-112667 PC **A03**/MF **A01**
National Science Foundation, Washington, DC. Div. of Science Resources Studies.
Projections of Science and Engineering Doctorate Supply and Utilization, 1982 and 1987.
Apr 79, 45p NSF-79/303
See also report dated Feb 75, PB-243 043.

The report provides projections of the supply and utilization of doctoral scientists and engineers through 1987. The report incorporates the effect of the domestic market for highly trained science and engineering (S/E) personnel upon the number of S/E doctorates awarded by American universities. Estimates of future utilization of doctorates are based on projection equations which link demand factors to employment.

PB80-113186 PC **A02**/MF **A01**
General Accounting Office, Washington, DC. Federal Personnel and Compensation Div.
Minimum Benefit Provision of the Civil Service Disability Retirement Program Should Be Changed.
Report to the Congress.
30 Nov 79, 16p FPCD-80/26

The minimum disability benefit provisions of the civil service retirement system were adopted to provide a reasonable income to employees who become disabled after short periods of Federal service. However, minimum benefits are being paid to many persons who are also receiving retirement benefits from former military careers. Revising the minimum benefit formula for retirees with income from other Federal service would reduce retirement costs significantly.

PB80-113236 PC **A03**/MF **A01**
Department of Agriculture Extension Service, Washington, DC.
Former des Demonstratrices de l'Enseignement Menager: Description d'un Cycle d'Etudes International aux U.S.A. (How to Train Assistants for Home Making).
Sep 63, 28p
Text in French. Report of Home Improvement Workshop July 22-September 13, 1963. Sponsored in part by Agency for International Development, Washington, DC.

The report is translated from a booklet called 'Participants Learn by Doing'. The apprenticeship is on the job with classes and visits, discussions, exhibits. Samples of subjects discussed: How to provide sewers, to make a refrigerator without ice, to keep food from spoiling, to make a shower with disposable means. The main purpose is to recognize and help solve the home making problems with readily available means. Participating countries: Northern Rhodesia, Ghana, Kenya, Nigeria, Liberia, Jamaica.

PB80-801590 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Job Satisfaction. Volume 3. November, 1976-September, 1978 (A Bibliography with Abstracts).
Rept. for Nov 76-Sep 78,
Jack Jones. Dec 79, 180p
See also Volume 1, 1964-1975, NTIS/PS-76/0817 and Volume 2, 1975-October, 1976, NTIS/PS-77/0944.

The bibliography contains selected abstracts of research reports of studies on generalized and specific areas of job satisfaction, both civilian and military. Emphasis is placed on evaluation and improvement of personnel development and management techniques. Attitude surveys of various socioeconomic groups in organizations are included. (This updated bibliography contains 176 abstracts, none of which are new entries to the previous edition.)

PB80-801608 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Job Satisfaction. Volume 4. October, 1978-October, 1979 (A Bibliography with Abstracts).
Rept. for Oct 78-Oct 79,
Jack E. Jones. Dec 79, 92p
Supersedes NTIS/PS-78/1079, NTIS/PS-77/0945, NTIS/PS-76/0818, NTIS/PS-75/708, and NTIS/PS-74/122. See also Volumes 1, 2, and 3, NTIS/PS-76/0817, NTIS/PS-77/0944, and PB80-801590.

The bibliography contains selected abstracts of research reports of studies on generalized and specific areas of job satisfaction, both civilian and military. Emphasis is placed on evaluation and improvement of personnel development and management techniques. Attitude surveys of various socioeconomic groups in organizations are included. (This updated bibliography contains 85 abstracts, all of which are new entries to the previous edition.)

PB80-801616 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Audiovisual Education. Volume 2. November, 1976-November, 1979 (A Bibliography with Abstracts).
Rept. for Nov 76-Nov 79,
Mary E. Young. Dec 79, 323p
Supersedes NTIS/PS-78/1190, NTIS/PS-77/1080, NTIS/PS-76/0983, NTIS/PS-75/685, and NTIS/PS-75/062. See also Volume 1, 1964-November, 1976, NTIS/PS-77/1079.

The bibliography covers audiovisual aids, visual aids, and other supports useful for instruction and training. Instructional materials, training films, teaching techniques, training methods, programmed instruction, industrial applications, audiovisual systems, simulators, slides, motion pictures, and multimedia presentations are described. The use of television and satellite systems is included. Flight simulators, covered in a separate bibliography, are excluded. (This updated bibliography contains 314 abstracts, 151 of which are new entries to the previous edition.)

5J. Psychology (Individual and Group Behavior)

AD-A075 099/2 PC **A03**/MF **A01**
Decision Research Eugene OR
Behavioral Aspects of Cost-Benefit Analysis.
Technical rept.,
Baruch Fischhoff. Jan 79, 37p Rept no. PTR-1077-79-1
Contract N00014-79-C-0029, ARPA Order-3668
See also Rept. no. PTR-1077-79-5, AD-A075 100.

Cost benefit analysis asks whether the expected benefits from a proposed activity outweigh its expected costs. Although based on an appealing premise and supported by a sophisticated methodology, these procedures have a number of characteristic limits on their usefulness as management tools. One set of limits is imposed by the unavailability of necessary inputs to the analysis. Neither the values nor the likelihood of many potential costs and benefits can be reasonably approximated by any formal computations. They must be derived in whole or in part by objective and reliable human judgment. Research has shown, however, that probability judgments are often quite unreliable and prone to systematic biases, while judgments of value are highly labile, changing with subtle (and formally irrelevant) shifts in the elicitation procedures. Relatively little is known about how to reduce these differences or assess the impact of those that remain. Related difficulties in assessing the quality of analyses comprise a second set of limits. There have been few systematic evaluations of formal analyses or attempts to develop a methodology for assessment. A third set of limits is the inability of the procedures to address critical issues in the management process they are designed to abet.

AD-A075 100/8 PC **A04**/MF **A01**
Decision Research Eugene OR
Measuring Labile Values: Problems in the Elicitation of Poorly-Formulated Preferences.
Technical rept.,
Baruch Fischhoff, Paul Slovic, and Sarah Lichtenstein. May 79, 59p Rept no. PTR-1077-79-5
Contract N00014-79-C-0029, ARPA Order-3668
See also Rept. no. PTR-1077-79-1, AD-A075 099.

Decision making requires two sequential actions: assessing what one wants and then figuring how best to obtain that goal. Typically it is assumed that people know what they want and that, with a little care, those values can be elicited. Furthermore, it is assumed that people's values are sufficiently well developed to be elicited in whatever form is most convenient for the elicitor. Research reviewed here suggests that this may not be the case and that a fundamental change may be called for in the way we study and elicit values. The elicitation procedures used may be a major factor in shaping the values of people who do not hold well-formulated values. An elicitor can induce random error, systematic error or unduly extreme judgements. There may be no substitute for an interactive, dialectical elicitation procedures that acknowledges the elicitor's role in helping to create and enunciate values. Respondents might be provided with analytical tools to deepen their perspective and help them make values judgments in their own best interests. However, there is no guarantee that even the greatest of care will resolve fundamental inconsistencies in values, and it may, at times, be necessary to acknowledge that we do not know what we want and structure our actions accordingly. (Author)

AD-A075 258/4 PC **A02**/MF **A01**
George Washington Univ Washington DC Inst for Management Science and Engineering
Use of Life-Test Data Analysis Methodology for Analyzing Undesirable Habitual Behavior.
Technical rept.,
Nancy R. Mann. 6 Jul 79, 24p Rept no. SERIAL-T-406
Contract N00014-73-C-0474

This report concerns statistical methodology used in the analysis of data consisting of failure times of samples of hardware operated under conditions equivalent to the intended usage of the hardware. Herein, this methodology is applied to sets of longitudinal data of individuals who abstain, for various periods of time, from engaging in undesirable habitual behavior. Although the behavior of interest may be of varying types, the examples given, with one exception, apply to alcoholics and problem drinkers. It is shown how application of the methodology to this of longitudinal data can be developed as a diagnostic tool for use in the treatment of addictions and undesirable habitual behavior, including identifying factors associated with unusually long remission periods, effective comparison of two or more treatment regimes, and characterization of individuals in terms of potential for rehabilitation. (Author)

AD-A075 280/8 PC **A03**/MF **A01**
Carnegie-Mellon Univ Pittsburgh PA Dept of Psychology
A Comparison of Texts and their Summaries: Memorial Consequences.
Final technical rept.,
Lynne M. Reder, and John R. Anderson. 5 Oct 79, 49p Rept no. TR-79-1
Contract N00014-78-C-0725

Chapters from college textbooks in diverse fields were compared with summaries constructed to convey the main points. A series of studies demonstrate consistent advantages for summaries. Summaries maintained their advantages at retention intervals of 20 minutes, 1 week, and 6 to 12 months. Summaries were superior both for questions directly taken from the text and for inference questions that required the subject to combine facts that had been studied. A transfer task looked at ability to learn new, related material as a function of how the previous material was learned. Summaries yielded better transfer. Reaction time differences showed the same pattern as percent correct. Summaries maintained their superiority even when the main points in the text were underlined. (Author)

AD-A075 420/0 PC **A02**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Construct Validity of Leader Effectiveness Criteria.
Technical paper,
Ronald G. Downey, Paul J. Duffy, and Samuel Shiflett. Jun 79, 21p Rept no. ARI-TP-368

Previous research on leadership effectiveness has often used criteria of one type and from one source. In this research, data on leadership effectiveness were collected with a variety of measures from different sources (leaders, peers, subordinates). Findings were analyzed for statistical convergence and by a multitrait-multimethod intercorrelation matrix. A satisfying degree of convergence but relatively little divergence appeared, and 47% of the variance was not accounted for by either one. Apparently, many measurement techniques or sources of data are essentially interchangeable. One cannot safely interpret results across different studies, however, because of the large amount of variance that remains unaccounted for by either convergent or divergent validity. The report is wirtten for psychologists. (Author)

AD-A075 454/9 PC **A06**/MF **A01**
Applied Psychological Services Inc Wayne PA Science Center
Background Data for the Human Performance in Continuous Operations Guidelines.
Technical rept. 15 Sep 77-15 Jan 79,
Mark G. Pfeiffer, Arthur I. Siegel, Stanley E. Taylor, and Lucius Shuler, Jr. Jul 79, 121p
APS79-2, ARI-TP-386
Contract DAHC19-77-C-0054

This report presents the technical data and literature review necessary to develop a companion volume, a handbook Human Performance in Continuous Operations Guidelines. The literature relates to the effects on individual performance of the stressors associated with continuous Army operations. Critical tasks associated with a typical continuous operation are identified along with the results of a study into the influence of various continuous operation stressors on performance effectiveness. Needed research into the effects of various continuous operations stressors on soldier performance is described. (Author)

AD-A075 535/5 PC **A03**/MF **A01**
Minnesota Univ Minneapolis Dept of Psychology
Effect of Point-in-Time in Instruction on the Measurement of Achievement.
Research rept.,
G. Gage Kingsbury, and David J. Weiss. Aug 79, 37p Rept no. RR-79-4
Contract N00014-76-C-0627

Item characteristic curve (ICC) theory has potential for solving some of the problems inherent in the pretest-test and test-posttest paradigms for measuring change in achievement levels. However, if achievement tests given at different points in the course of instruction tap different achievement dimensions, the use of ICC approaches and/or change scores from these tests is not desirable. This problem is investigated in two studies designed to determine whether or not achievement tests administered at different times during a sequence of instruction actually measure the same achievement dimensions. Results raised questions about the utility of the pretest-test paradigm for measuring change in achievement levels, since a comparison of a ICC parameter estimates indicated that a change in the dimensionality of achievement had occurred within the short (4-week) period of instruction. This change was also observed using a factor analytic comparison. Use of the test-posttest paradigm to measure retention was supported, since a regression comparison of students acheivement level estimates did not indicate any significant change in the achievement metric up to 1 month after the peak of instruction. The significance of this result for the use of adaptive testing technology in measuring achievement is described.

AD-A075 591/8 PC **A08**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics
A Study of the Relationship between Attitudes of Missile Combat Crew Members and Missile Wing Operations Performance.
Master's thesis,
Russell J. Anarde, and Dana H. Bell. Sep 79, 169p Rept no. AFIT-LSSR-6-79B

The focus of past missile career field efforts has centered on the attitudes and motivation of missile crew members. Research has shown that while crew member attitudes toward their job and toward the missile career field have not changed significantly in aggregate terms, attitudes do vary between wings and, perhaps, within wings over time. Little attention has been focused on the possible correlation of these attitudes with unit performance. The purpose of this study was to determine if MCCM attitudes continue to differ from one Minuteman wing to another, to determine if MCCM attitudes within each wing have changed since 1976, to determine if operations performance differs from one Minuteman wing to another, and to determine if any relationship exists between MCCM attitude and Minuteman wing operations performance. The authors conclude that while MCCM attitudes in 1978 differ from one wing to another, MCCM attitudes within each wing have not significantly changed since 1976, that operations performance does not significantly differ from one Minuteman wing to another and, therefore, no basis exists in this study for supporting a relationship between MCCM attitude and Minuteman wing operations performance. (Author)

N79-32835/7 PC **A02**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
A Theoretical and Experimental Analysis of the Outside World Perception Process.
P. H. Wewerinke. 15 Jun 78, 23p NLR-MP-78020-U
Conf-Presented at 14th Ann. Conf. On Manual Control, Los Angeles, 25-27 Apr. 1978.

The outside scene is often an important source of information for manual control tasks. Important examples of this are car driving and aircraft control. The modeling for this visual scene perception process on the basis of linear perspective geometry and the relative motion cues is discussed. Model predictions, utilizing psychophysical threshold data from baseline experiments and literature on a variety of visual approach tasks, are compared with experimental data. Both the performance and workload results illustrate that the model provides a meaningful description of the outside world perception process, with a useful predictive capability.

N79-32836/5 PC **A04**/MF **A01**
Research Inst. of National Defence, Stockholm (Sweden).
Shalit Perceptual Organization and Reduction Questionnaire (SPORQ). Report 2: Characteristics and Reliability.
B. Shalit. May 79, 73p FOA-C-55031-H6

The characteristics and reliability of the Shalit Perceptual Organization and Reduction Questionnaire are examined. The population to which the test was applied consisted of three main groups: national servicemen-conscripts (N=201), professional soldiers (N=383), and civilians (N=145). Each of these were further subdivided into four groups representing various types of occupations or units. The distributions of their scores (structural - quantitative and content - qualitative) are analyzed and discussed. An analysis of structure and interrelationships between the elements of the test was made and a mapping sentence formulated. Test scoring reliability and test-retest reliability was also investigated. The test was shown to have good overall scoring and retest reliabilities, ranging from .70 to .98 and from .56 to .96, respectively.

N79-33838/0 PC **A05**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Models of Human Operators in Vision Dependent Tasks.
M. C. Waller. Oct 79, 86p NASA-CP-2103, L-13338
Conf-Seminars Held at the Human Factors Soc. 1979 Ann. Meeting, Boston, 29 Oct. - 1 Nov. 1979; Sponsored in Part by Human Factors Soc. Visual Performance Tech. Group.

No abstract available.

N79-33851/3 PC **A03**/MF **A01**
San Jose State Univ. Foundation, Calif.
The Role of Cognitive Switching in Head-Up Displays.
E. Fischer. May 79, 49p NASA-CR-3137, A-7776
Grant NSG-2269

The pilot's ability to accurately extract information from either one or both of two superimposed sources of information was determined. Static, aerial, color 35 mm slides of external runway environments and slides of corresponding static head-up display (HUD) symbology were used as the sources. A three channel tachistoscope was utilized to show either the HUD alone, the scene alone, or the two slides superimposed. Cognitive performance of the pilots was assessed by determining the percentage of correct answers given to two HUD related questions, two scene related questions, or one HUD and one scene related question.

PB80-107881 PC **A99**/MF **A01**
Utah State Board of Education, Salt Lake City.
Improving Student Discipline in Behavior and Studies (Utah).
Final rept.,
Paul M. Merrill, Steven A. Strickland, Jack Welsh, and Howard Christensen. 30 Jun 78, 768p
Prepared in cooperation with Brigham Young Univ., Provo, UT. David O. McKay Inst.

A statewide survey was taken to determine: (1) The nature and level of discipline problems in Utah schools; (2) The perception of various social groups on the nature of school discipline; and (3) Solution strategies for improving school discipline. The report is divided into five major sections. The first section contains a brief review of the current theoretical and research literature related to student discipline and also lists those issues and questions deemed most critical by the Executive Committee on Discipline. The second section summarizes the method and procedures used in the study: sampling, survey instrument construction, and data collection. The third section describes the results of the study. The fourth section addresses the major conclusions and recommendations of the study. The final section contains the Appendices of the report which includes copies of the survey instruments and raw data.

PB80-112428 PC **A12**/MF **A01**
National Inst. on Drug Abuse, Rockville, MD. Div. of Research.
Behavioral Analysis and Treatment of Substance Abuse,
Norman A. Krasnegor. Jun 79, 266p DHEW/PUB/ADM-79-839, RESEARCH MONOGRAPH SER-25
Also pub. as National Inst. on Drug Abuse, Rockville, MD. Div. of Research rept. no. NIDA/RD-79/30.See also report dated Dec 76, PB-266 820.

Technical review papers present commonalities in the behavioral analysis and treatment of sub-

stance abuse (drugs, tobacco, ethanol, and food). Specific behavior therapeutic approaches are presented for the treatment of drug addiction, smoking, drinking, and obesity. An agenda for future research needs is included.

5K. Sociology

AD-A075 250/1 PC A08/MF A01
Naval Postgraduate School Monterey CA
Pretrial Intervention in New Jersey.
Master's thesis,
John A. Rank, III. Apr 78, 166p

The author concludes that the Pretrial Intervention Program in New Jersey is an extremely expensive piece of judicial legislation. In its enthusiasm to implement this innovative reform, the Supreme Court has transgressed the boundaries outlined under the separation of powers doctrine. It has attempted to usurp the power of the legislature to define classes of offenders by taking it upon itself to decriminalize certain offenses it considers to be victimless, and by giving offenders the opportunity to avoid prosecution when, in the courts opinion, the conviction will harm the individual. By doing this the Courts have, in effect, overridden the legislature's declarations that individuals who violate certain norms should be convicted and punished. By mandating the establishment of programs and by dictating the scope of services to be provided by these programs, the court has effectively made appropriations decisions that are not rightfully theirs to make.

AD-A075 497/8 PC A10/MF A01
Army Infantry School Fort Benning GA
Race Relations Orientation Packet for Leaders.
1 Jul 73, 210p

The purpose of this packet is to provide the leader with the necessary information to initiate a race relations education program within his unit. The four sections are targeted at three basic areas; Race Relations (RR)/Equal Opportunity (EO) management (Army Policy), Historical Background, and Social Concepts. These areas represent the leader's responsibilities, and a knowledge of them is basic to the establishment of an effective unit race relations education program.

AD-A075 511/6 PC A09/MF A01
Construction Engineering Research Lab. (Army) Champaign Il
Real Estate Cost Estimating Techniques for PL 91-646 Relocation Costs.
Final rept.,
U. R. Poskus , G. D. Stamas , and S. P. Stawarz.
Sep 79, 191p Rept no. CERL-TR-P-103
Contracts IAO-RE-7T-1, IAO-RE-77-1

This report documets the development of a predicting model which would better estimate the amount of money required by Districts to compensate individuals relocated from their residences, businesses, or farms as a result of U. S. Army Corps of Engineers construction. The predictions are the result of applying the least squares method to previous District and state payment data. Three different apprcaches for developing the model were attempted. The approach which used Docket Sheet data broken out by Fiscal Years 72 through 76 was selected as having the highest probability for success. Using the information from these Docket Sheets, average total payments were computed by state and by District, and average values were found for each of 15 payment categories. (Author)

AD-A075 532/2 PC A02/MF A01
Army Command and General Staff Coll Fort Leavenworth KS
The U. S. Armed Forces and Their Influence on the American Public.
Research study,
Ralph D. LeBlanc. May 79, 16p

This report discusses the effects of service in armed forces on American public. Subjects include value system changes, attitudes, future view of military and what it has done to shape public policy.

AD-A075 569/4 PC A12/MF A01
Fort Benning Childrens Schools CA
Multi-Ethnic Curriculum Guide,
Earl L. Miley, Sue Henry, Margaret Love, James Green, and Fleda Glenn. 18 Feb 72, 254p

This guide has been prepared for use by the teachers in the Fort Benning Children's Schools. The material presented in this guide is designed to be integrated into the curriculum at the appropriate time and place. The individual teacher on each grade level will be responsible for assimilating the material and making a determination as to how the material will be presented to the class.

PB80-105372 PC A04/MF A01
Personnel Management Association of Aztlan, San Diego, CA.
A Conceptual Model of the Management 'Ethos' Experienced by the Hispanic Administrator and Factors Hindering Advancement to Higher Levels within an Organization.
Final rept.,
Adolpho Sanchez. 28 Sep 78, 74p DLETA-21-06-77-25-1
Contract DL-21-06-77-25

The study addresses itself to the underlying institutional biases which appear to limit the ability of Hispanic administrators to attain high-level administrative positions. A review of the employment characteristics of the Hispanic community indicates a wide gap in the placement and advancement of the Hispanic in every level of the employment sector. The purpose of this study was to explore the notion that in order to increase the employment opportunities for the whole Hispanic community, it is first necessary to increase the number of Hispanic administrators who have decision-making power. In order to support increased access of the Hispanic into the general employment market, there must be a greater influx of Hispanic administrators into organizations so that an attitudinal climate is created within an organization which supports the increased placement of Hispanics in lower-level positions. This study explored the attitudinal differences between Hispanic and non-Hispanic administrators and determined the impact of these attitudinal differences on the placement of the Hispanic within organizations.

PB80-106818 PC A24/MF A01
Midwest Research Inst., Kansas City, MO.
Unstructured Technology Assessments - Case Histories of Public Alarm Over Technology.
Final rept.
18 Oct 74, 560p NSF/RA/G-74/078
Grant NSF-GI-32192

Fifty-five case histories are presented to illustrate the 'social shock' impacts of technologies on society's institutions and systems. These cases reflect the public's concerns in the areas of reproduction and genetics, food and medicines, x-ray hazards, environmental problems, and issues related to federal projects. The format of the case histories are standardized to serve as a useful data bank for interested readers and future researchers. The format consists of a title, abstract, time-line of significant events, narrative account of background, key events and roles, disposition, and author's comments and references. Results of the study constitute a guide to the kinds and range of problems currently encountered, a ready reference to examples of past alarms and how they have been resolved, and a stimulus to encourage wise use of technologies in the future.

PB80-107824 PC A99/MF A01
Nebraska Developmental Disabilities Planning Council, Lincoln.
State Plan for Developmental Disabilities Services and Facilities Construction Program for Fiscal Year 1979 (Nebraska).
1979, 607p
See also report for 1978, PB-293 981.

The Developmental Disabilities Program serves to improve and coordinate the provision of services to persons with Developmental Disabilities. The program also serves to advocate for the rights of persons with developmental disabilities. The mission of the Council is to design and promote the implementation of integrated statewide planning, advocacy, and service systems which are designed to meet the individual needs of citizens who have a developmental disability and to provide opportunities equal to those of all citizens for the attainment of the least restrictive lifestyle.

PB80-112196 PC A05/MF A01
General Accounting Office, Washington, DC. Community and Economic Development Div.
Urban Homesteading: A Good Program Needing Improvement.
Report to the Congress,
13 Nov 79, 77p CED-80/3

Declining urban neighborhoods are being revived by homesteading whereby an abandoned house is given to a homesteader who must fix it up and live there for a certain number of years in order to receive title to the house. The program holds promise but some improvements are needed. The Department of Housing and Urban Development needs to (1) identify houses difficult to homestead and decide what should be done with them; (2) encourage communities to use methods proven successful; (3) monitor the homesteading program; (4) expand its reporting system and use the information gathered for monitoring the program; and (5) stop giving away for homesteading higher value, marketable houses that are located in unblighted neighborhoods.

PB80-113129 PC A03/MF A01
North Carolina State Univ. at Raleigh. Sea Grant Coll. Program.
Vacation and Weather Guide to Coastal North Carolina.
1979, 32p UNC/SG-79/02, NOAA-79100103

The brochure describes the recreational areas of the coastal zone of North Carolina. The weather as it pertains to the various activities such as boating, bicycling, shellfishing, fishing, hunting, camping, surfing, bird watching, scuba diving and hang gliding, is discussed. Weather hazards are listed and finally helpful publications are presented.

PB80-801210 PC N01/MF N01
National Technical Information Service, Springfield, VA.
Crime and Law Enforcement in Transportation Systems (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Edith Kenton. Dec 79, 116p
Supersedes NTIS/PS-78/1139, NTIS/PS-77/1018, NTIS/PS-76/0920, and NTIS/PS-75/732.

References are cited on the law enforcement aspects of motor vehicle accidents, traffic control, and motor vehicle operators involved in alcohol and drug related crashes. Other topics cover cargo security, including nuclear materials, vandalism of transportation equipment and aircraft hijacking.

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

AD-A075 179/2 PC A02/MF A01
Foreign Technology Div Wright-Patterson AFB OH
Automatic Urine Sugar Analysis,
A. Dempe, and N. Beeke. 11 May 79, 10p Rept no. FTD-ID(RS)T-0538-79
Edited trans. of Zeitschrift fuer Medizinische Labortechnik (German D. R.) v13 n5 p325-328 1972.

No abstract available.

AD-A075 450/7 PC A02/MF A01
Baylor Coll of Medicine Houston TX Dept of Pediatrics
Water-Cytoskeletal Interactions in Dividing Cells.
Final rept. 1 Feb 78-31 Jan 79,
Paula T. Beall. 27 Aug 79, 19p
Contract N00014-78-C-0068

Nuclear magnetic resonance spectroscopy was used to monitor the physical properties of water in living cultured cells as the macromolecular proteins of the cellular cytoplasm were manipulated by temperature and drugs. The effect of chromatin condensation on the structure of water in its vicinity was determiend in synchronized HeLa -human cervical carcinoma cells during the entire cell

cycle. The treatment of isolated nuclei with spermine, a drug causing chromatin condensation, showed that a large part of the reproducible pattern of changes in NMR relaxation times for water in the cell cycle were due to chromatin conformational changes in the cell nucleus. The effect of the polymerization and depolymerization of the fibrous structural proteins called microtubules also has a profound effect on water behavior. In a purified system of dog brain microtubules and in WI 38 human cells, a temperature dependent shift in NMR relaxation times for water could be correlated with the temperature depolymerization of microtubules. In HeLa cells treated with cytochalasin B, a drug known to depolymerize actin filaments in the cell cytoplasm, an increase in freedom of motion of water molecules was seen upon a loss of organization in the structural proteins. A new theory on the mechanism of secretory diarrhea has come from these observations.

AD-A075 546/2 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda Md
Separation of Biogenic Amines by Use of Reversed-Phase Liquid Chromatography and Fluorescent Detection.
Medical research progress rept.,
Leroy D. Mell, Jr. 1979, 4p Rept no. NMRI-79-52
Pub. in Clinical Chemistry, v25 n6 p1187-1188 1979.

No abstract available.

6B. Bioengineering

PB80-110075 PC **A06**/MF **A01**
Washington Univ., Seattle. Dept. of Chemical Engineering.
Interaction of Natural and Chemically Modified Aortic Tissue Proteins with Blood.
Annual rept. 1 Jul 77-15 Aug 78,
Allan S. Hoffman, Thomas A. Horbett, Steven Hanson, and Buddy Ratner. Jul 79, 109p NIH-N01-HV-4-2970-4-A
Contract N01-HV-4-2970-4
See also PB-271 428.

The overall goal of this project is the evaluation of the thrombogenicity of aortic subendothelial connective tissue components. The major accomplishments achieved in this contract year include: (1) Completion of studies of the thrombogenicity of four types of polyurethanes, which confirmed major differences in platelet consumption induced by those polymers. (2) Further studies of platelet loss induced by injection of collagen into baboons. (3) Platelet consumption by immobilized collagen on shunts was found to depend on the collagen immobilization solvent, confirming previous results. (4) The adhesion of platelets to collagen immobilized on shunts was studied after brief exposure to flowing baboon blood and found to be very extensive and rapid. (5) New preparations of aortic collagen type I and III and anterior lens capsule type IV collagen were made and characterized. (6) A new molding apparatus for forming gels on the lumen of shunts was built.

6C. Biology

AD-A075 049/7 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Lymphocyte Binding and T Cell Mitogenic Properties of Group A Streptococcal Lipoteichoic Acid.
Medical research progress rept.,
Edwin H. Beachey, James B. Dale, Stephen Grebe, Aftab Ahmed, and W. Andrew Simpson. 19 Jun 78, 10p Rept no. NMRI-79-25
Pub. in Jnl of Immunology, v122 n1 p189-195 Jan 79.

No abstract available.

AD-A075 510/8 PC **A02**/MF **A01**
Georgetown Univ Washington DC School of Medicine
Dissociation of HLA-D and HLA-DR Using Primed LD Typing.
Medical research progress rept.,
R. J. Hartzman, F. Pappas, P. J. Romano, A. H. Johnson, and F. E. Ward. 1978, 7p NMRI-78-120
Contracts N00014-77-C-0747, N00014-76-C-1173
Pub. in Transplantation Proceedings, v10 n4 p809-812 Dec 78. Sponsored in part by Grant PHS-GM-10356.

No abstract available.

AD-A075 543/9 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Preliminary Evidence for a New Non-H-2 Locus that Codes for Lymphocyte-Activating Determinants Distinct from Mls.
Medical research progress rept.,
A. Ahmed, B. Subbarao, I. Scher, J. J. Ryan, and W. Paul. 1979, 7p Rept no. NMRI-79-39
Pub. in Transplantation Proceedings, v11 n2 p1367-1370 Jun 79.

No abstract available.

AD-A075 544/7 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Cross-Reactivity Exists between Mls(a) and Mls(D) Lymphocyte-Activating Determinants as Demonstrated by the Negative Clonal Selection of Responder Cells in a Mixed Lymphocyte Reaction.
Medical research progress rept.,
K. W. Sell. 1979, 4p Rept no. NMRI-79-40
Pub. in Transplantation Proceedings, v11 n2 p1377-1378 1979.

No abstract available.

AD-A075 560/3 PC **A02**/MF **A01**
Army Research Inst of Environmental Medicine Natick MA
Transmission and Scanning Electron Microscopy of Cell Monolayers Grown on Polymethylpentene Cover-Slips.
L. R. Trusal, C. J. Baker, and A. W. Guzman. 1979, 11p Rept no. USARIEM-M-34/78
Pub. in Stain Technology, v54 n2 p77-83 1979. Supersedes Rept. no. USARIEM-M-34/78 dated 19 Jul 78, AD-A056 626.

No abstract available.

LA-7886-T PC **A08**/MF **A01**
Los Alamos Scientific Lab., NM.
Single Particle Analysis with a 360 exp 0 Light Scattering Photometer.
M. F. Bartholdi. Jun 79, 173p
Contract W-7405-ENG-36
Thesis.

Light scattering by single spherical homogeneous particles in the diameter range 1 to 20 mu m and relative refractive index 1.20 is measured. Particle size of narrowly dispersed populations is determined and a multi-modal dispersion of five components is completely analyzed. A 360 exp 0 light scattering photometer for analysis of single particles has been designed and developed. A fluid stream containing single particles intersects a focused laser beam at the primary focal point of an ellipsoidal reflector ring. The light scattered at angles theta = 2.5 exp 0 to 177.5 exp 0 at phi = 0 exp 0 and 180 exp 0 is reflected onto a circular array of photodiodes. The ellipsoidal reflector is situated in a chamber filled with fluid matching that of the stream to minimize refracting and reflecting interfaces. The detector array consists of 60 photodiodes each subtending 3 exp 0 in scattering angle on 6 exp 0 centers around 360 exp 0 . 32 measurements on individual particles can be acquired at rates of 500 particles per second. The intensity and angular distribution of light scattered by spherical particles are indicative of size and relative refractive index. Calculations, using Lorenz--Mie theory, of differential scattering patterns integrated over angle corresponding to the detector geometry determined the instrument response to particle size. From this the expected resolution and experimental procedures are determined.Ultimately, the photometer will be utilized for identification and discrimination of biological cells based on the sensitivity of light scattering to size, shape, refractive index differences, internal granularity, and other internal morphology. This study has demonstrated the utility of the photometer and indicates potential for application to light scattering studies of biological cells. (ERA citation 04:052107)

N79-33854/7 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
Publications of the Planetary Biology Program for 1978: A Special Bibliography.
L. G. Pleasant, and R. S. Young. Oct 79, 38p
NASA-TM-80745

The planetary events which are responsible for, or related to, the origin, evolution, and distribution of life in the universe are investigated. Bibliographies from chemical evolution, organic geochemistry, life detection, biological adaptation, bioinstrumentation, planetary environments, and origin of life studies are presented.

PB80-105422 PC **A04**/MF **A01**
Shinnecock Tribe Oyster Project, Southampton, NY.
The Shinnecock Tribe Oyster Project/Oyster Farming and Rafting Techniques, Shinnecock Bay, Southampton, Long Island, New York.
Annual rept.
Jul 79, 71p EDA-79-0157
Grant EDA-01-6-01367-1
Prepared in cooperation with Long Island Oyster Farms, Inc., Northport, NY.

This report is the result of a continuing study to establish the feasibility of shellfish production and a vertical integrated food processing plant. The Shinnecock Reservation Bay is suitable for utilizing present day restocking methods and hatchery techniques, the possibility exists for developing a new shellfish industry on Eastern Long Island. The program was divided into three phases. The hatchery was also designed to prove the feasibility of a future full-scale shellfish hatchery.

PB80-106206 PC **A02**
Alaska Univ., Fairbanks. Inst. of Marine Science.
Growth of Pen Reared Pink Salmon Fry, 'Oncorhynchus gorbuscha', Feeding on Available Marine Zooplankton,
David L. Urquhart, and David R. Barnard. c1979, 7p NOAA-79101104
Grant NOAA-04-8-M01-49
Pub. in Aquaculture, v17 p251-256 1979.

Pink salmon fry, Oncorhynchus gorbuscha, were held in a small floating net pen for nearly 7 weeks. The pen was moored in a narrow channel where tidal current velocities reach values near 0.4 m/s. The fry were maintained solely by marine zooplankton carried into the enclosure by surface currents. Samples of approximately 100 fry were removed weekly from the pen to monitor growth and diet. For the 1049 fry which began the experiment, fork length (FL) averaged 32.7 micrometers and wet weight (W) 0.23 g. Forty-eight days later 330 fry remained in the pen; FL had increased to 44.1 micrometers and W to 0.76 g. Natural mortality in the pen was less than 2% during this period. (Copyright (c) 1979, Elsevier Scientific Publishing Company.)

PB80-111313 PC **A03**/MF **A01**
Rhode Island Univ., Kingston. Sea Grant Program.
Suggested Design Modifications to the URI 340 Series Trawl Following Tank Testing.
G. A. Motte, A. J. Hillier, and L. R. Bonier. 1979, 30p MARINE BULL-32, NOAA-79092401
Grant NOAA-04-80M01-147

The performance of six model bottom trawls was evaluated in the White Fish Authority Flume Tank in Hull, England. Five of the models incorporated modifications to the URI 340 trawl design, and the sixth was constructed to the standard design. The objective of the study was to assess the effectiveness of the various modifications in correcting the flattening and resulting chafing of lower wings reported with the standard design. The tests demonstrated that hanging the lower wings more tightly to the sweep resulted in a highly favorable net configuration.

PB80-111636 PC **A02**/MF **A01**
Mississippi Agricultural and Forestry Experiment Station, State College.
Heritabilities and Genetic Correlations of Desirable Commercial Traits in Channel Catfish.
Completion rept. Jul 75-Sep 78,
Roland E. Reagan, Jr. Sep 79, 19p NOAA-79092714

The report gives estimates of heritability and genetic correlation for channel catfish 30-180 days of

age for length, weight, head width, head depth, dressed weight were computed for 1975, 1976 and 1977 on the Tupelo strain. Thirty day estimates were highly variable due to maternal affect on egg diameter and environmental influences. Estimates of heritability and genetic correlation for 18 month old channel catfish of the Tupelo strain for 1975, 1976 were made. These values were also variable due to differences in sib groups available for analysis. Selection on an index was most efficient giving 58.5 g increase per generation for weight at 18 months and 6.1 mm increase per generation for length at 90 days.

PB80-111644 PC **A03**/MF **A01**
Nebraska Game and Parks Commission, Lincoln.
Evaluation of the Influence of Tributaries to the Missouri River Commercial Fishery.
Completion rept. May 76-Jun 79,
Larry W. Hesse, Larry Zadina, Randy Winter, Leigh Ann Retelsdorf, and Brad Newcomb. Sep 79, 29p NOAA-79092715

Channel catfish were sampled in 1976, 1977 and 1978 from the Little Nemaha River and the Missouri River near the mouth of the Little Nemaha. Fish were tagged to determine movement patterns and length, weight, and pectoral spine samples were taken to obtain life history information. Gonads were removed from selected individuals to quantify sexual history. Age-0 fish were sampled from the Little Nemaha and several other tributary steams to document spawning. Movement data suggests that tributaries are valuable in maintaining stocks of Missouri River channel catfish.

PB80-112436 PC **A02**
North Carolina State Univ. at Raleigh.
Aspects of Family and Kinship in a North Carolina Coastal Community: A Comparative Study.
Sea Grant reprint,
James C. Sabella, Richard D. Dixon, and Marcus J. Hepburn. 1979, 9p UNC/SGR-135, NOAA-79092709
Pub. in Maritime Political Management, v6 n2 p93-99 1979.

The almost total absence of social-science data on North Carolina coastal fishing communities has provoked this preliminary study of the role played by family and kinship ties among fishermen and boat builders in such a community, with a view to developing new fisheries management strategies from an assessment of the social and economic impacts of those which already exist.

PB80-113343 PC **A07**/MF **A01**
TRW Systems Group, Redondo Beach, CA.
Survey 2 Plan for MARMAP. Plan for Conduct of Ground Fish Surveys (Designated 'Survey 2') by the Marine Resources Monitoring Assessment and Prediction (MARMAP) Program.
Oct 74, 129p NOAA-79101601

This document is the basic, top-level plan to conduct the Groundfish Surveys (designated Survey 2) which form a part of the MARMAP Program. This plan defines Survey 2 operations involving the collection, processing, and analysis of demersal fish, epibenthic invertebrates and infauna and related environmental data in order to satisfy the objectives. The objective of this Survey 2 plan is the standardization of groundfish survey procedures on a program-wide basis. Survey 2, which emphasizes the assessment of adult stocks of groundfish, has MARMAP counterparts that assess the other important biological communities.

PB80-801442 PC **N01**/MF **N01**
Naticnal Technical Information Service, Springfield, VA.
Fishways--Design and Operation (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Robena J. Brown. Dec 79, 88p
Supersedes NTIS/PS-78/1229, NTIS/PS-77/1112, NTIS/PS-76/1019, and NTIS/PS-75/868.

Studies describing models and construction of fishways are cited in the bibliography. Protectors, guidance devices, habitat improvement, and maintenance are included, as well as fishways and fish ladders for streams, lakes, dams, and rivers. (This updated bibliography contains 81 abstracts, 1 of which is a new entry to the previous edition.)

6D. Bionics

N79-34016/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
Electrooptical Model of the First Retina Layers of a Visual Analyzer.
Y. L. Chibalashvili, A. D. Riabinin, S. V. Svechnikov, Y. L. Chibalashvili, and A. M. Shkvar. Sep 79, 14p NASA-TM-75509
Contract NASW-3199
Tran-Transl. Into English from Poluprov. Tekh. Mikroelektron. (Ussr), No. 8, 1972 p 15-21. Misc-Original Language Document Published as A73-13657. Subm-Transl. By Kanner (Leo) Associates, Redwood City, Calif.

An electrooptical principle of converting and transmitting optical signals is proposed and used as the basis for constructing a model of the upper layers of the retina of the visual analyzer of animals. An evaluation of multichannel fibrous optical systems, in which the conversion of optical signals is based on the electrooptical principle, to model the upper retina layers is presented. The symbolic circuit of the model and its algorithm are discussed.

6E. Clinical Medicine

AD-A075 045/5 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Hepatitis B Surface Antigen and Antibody in a Military Community During a Hepatitis B Epidemic,
Alfred M. Allen, Jerome J. Karwacki, Gilbert R. Irwin, and Robert H. Pinkerton. 1979, 6p
Pub. in Military Medicine, v144 n9 p597-600 Sep 79.

No abstract available.

AD-A075 047/1 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Serology, Cell Reactivity, Genetics and Disease: A Collaborative Study by U.S. 1 Region.
Medical research progress rept.,
F. E. Ward, A. H. Johnson, D. B. Amos, C. M. Zmijewski, and I. Elrod. 1978, 17p Rept no. NMRI-78-125
Pub. in Histocompatibility Testing 1977, Copenhagen, Munksgaard, p529-542 1978.

No abstract available.

AD-A075 048/9 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Endoscopy as an Aid to Endodontic Diagnosis.
Medical research progress rept.,
Steven G. Detsch, Walter T. Cunningham, and John M. Langloss. 1979, 4p Rept no. NMRI-79-24
Pub. in Jnl. of Endodontics, v5 n2 p60-62 1979.

No abstract available.

AD-A075 051/3 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
The Antigenicity of Freeze-Dried and Deep-Frozen Bone Allografts in Rabbits.
Medical research progress rept. no. 6 (Final),
G. E. Frielaender, D. M. Stron, and K. W. Sell. 1977, 8p
Pub. in Progress in Refrigeration Science and Technology, v3 p148-153 1977., Introduction in French.

No abstract available.

AD-A075 052/1 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Organ Preservation.
Final rept.,
K. W. Sell, and G. E. Friedlaender. 1977, 11p
Pub. in Progress in Refrigeration Science and Technology, v3 p57-63 1977. Summary in French.

No abstract available.

AD-A075 085/1 Not available NTIS
Rutgers - the State Univ New Brunswick NJ Dept of Mathematics
Biomathematical Models of Schizophrenia,
Jane Cronin. 1979, 13p ARO-12981.4-M
Grant DAHC04-75-G-0148
Availability: Paper of unidentified jnl., US N.D. p87-99 (No copies furnished by DTIC).

No abstract available.

AD-A075 160/2 PC **A03**/MF **A01**
Academy of Health Sciences (Army) Fort Sam Houston TX Health Care Studies Div
AMOSIST Program Field Evaluation: Executive Summary.
Final rept.,
Aaron W. Schopper. Feb 79, 28p Rept nos. HCSD-78-002E, HCSD-5

A multiphase, large scale evaluation of the Army's AMOSIST Program (an algorithm based health care delivery system employing physician supervised enlisted corpsmen, AMOSISTs, as direct care providers) found that, in comparison with patients treated for similar categories of illness in general outpatient clinics, the average patient treated in AMOSIST-staffed clinics: (a) reported greater satisfaction with care received, (b) required less physician time, (c) involved less care-provider-related cost, and (d) received equally effective care. The program acceptance by the non-program-related hospital staff was judged to be only moderate. A principal concern of both non-AMOSIST staff and the AMOSIST's physican supervisors was the AMOSIST's competence, a concern which was heightened by the withdrawal of the better qualified Clinical Specialist (MOS 91C) from the program. Due to factors associated with the program's manual of algorithms (inefficient) and data recording procedures (logic employed not readily apparent, extent and nature if consultation-related logic overrules not determinable), the manual was not being utilized as required and treatment-related audits were not being performed satisfactorily--a combination which resulted in unacceptably high error rates. Consequently, the program was judged to be medico-legally 'at risk'. Recommendations were made to modify progam materials and effect greater monitorship. (Author)

AD-A075 166/9 PC **A02**/MF **A01**
Naval Dental Research Inst Great Lakes IL
Permeability of Cellophane Membranes to Parotid Proteins during Dialysis,
B. L. Lamberts, and T. S. Meyer. Jun 79, 6p Rept no. NDRI-PR-79-02
Pub. in Experientia, v35 p165-166 1979.

No abstract available.

AD-A075 239/4 PC **A09**/MF **A01**
Army Environmental Hygiene Agency Aberdeen Proving Ground MD
Guide to the Prevention and Control of Hospital-Associated Infections. Revised.
Technical guide (medical),
James B. Hammond. Aug 79, 186p Rept no. USAEHA-TG-050
Revision of report dated Apr 76, AD-A023 884. Errata sheet inserted.

This guide consolidates the vast amount of both published and unpublished information on the subject of hospital-associated infections. Most of this information has evolved during an era of changing concepts, particularly those regarding the relative importance of the hospital environment in the etiology of such infections. Although many of the principles of prevention and control learned and applied in the staphylococcal era of two decades ago are applicable today, the realization that many other types of infection also arise in the hospital has necessitated the development of improved methods for recognition, and for their prevention and control. While the principles and concepts presented touch upon every individual in the hospital whether engaged in direct patient care or not, this guide has been prepared primarily to assist those directly involved in the prevention and control of these infections. (Author)

AD-A075 256/8 PC **A02**/MF **A01**
New Mexico Univ Albuquerque
Environmental Stimulus Control of Drug Taking Behavior.
Final rept. Jun 74-Nov 75,

Douglas P. Ferraro. May 79, 23p
Contract DAMD17-74-C-4097

Two Macaca mulatta and one Macaca java monkeys were trained to press a key for food pellets on a differential reinforcement of low rate (DRL) schedule which required consecutive key-press responses to be spaced at least 20 sec apart in order to produce reinforcement. When behavior had stabilized, the monkeys were administered either 0.0, 0.05, 0.10, .025, or 0.50 mg/kg of cocaine i.v. during daily sessions. Cocaine produced a bi-component, dose-related complete cessation of responding which began and ended abruptly. Following this post-infusion pause, a dose-related behavioral disruption in the form of shortened inter-response times was observed. (Author)

AD-A075 323/6 PC **A13/MF A01**
Army Medical Bioengineering Research and Development Lab Fort Detrick MD
US Army Medical Research and Development Report.
Annual progress rept. 1 Oct 77-30 Sep 78,
Charles M. Dettor. 1 Oct 78, 279p

The Annual Progress Report, Fiscal Year 1978 summarizes research performed by the US Army Medical Bioengineering Research and Development Laboratory in projects authorized by The Surgeon General, US Army, and Commander, US Army Medical Research and Development Command; and supported by RDTE funds from the US Army Medical Research and Development Command. (Author)

AD-A075 523/1 PC **A02/MF A01**
Naval Medical Research Inst Bethesda MD
Extracorporeal Glass-Wool Filtration of Whole Blood Enhances Post-Ischemic Recovery of the Cortical Sensory Evoked Response.
Medical research progress rept.,
J. M. Hallenbeck, T. W. Furlow, Jr., T. A. Ruel, and L. J. Greenbaum, Jr. 1979, 9p Rept no. NMRI-79-37
Pub. in Stroke, v10 n2 p158-164 Mar-Apr 79.

No abstract available.

AD-A075 525/6 PC **A02/MF A01**
Naval Medical Research Inst Bethesda MD
Decompression Sickness: Building an Understanding.
Medical research progress rept.,
Paul K. Weathersby. 1979, 6p Rept no. NMRI-79-38
Pub. in Faceplate v10 n2 p11-13 1979.

No abstract available.

AD-A075 547/0 PC **A02/MF A01**
Naval Medical Research Inst Bethesda MD
Assessment, of Protease (Elastase) as a 'Pseudomonas aeruginosa' Virulence Factor in Experimental Mouse Burn Infection.
Medical research progress rept.,
Olgerts R. Pavlovskis, and Bengt Wretlind. 1979, 10p Rept no. NMRI-79-53
Pub. in Infection and Immunity, v24 n1 p181-187 Apr 79.

No abstract available.

HRP-0023419/5 Not Available NTIS
Philadelphia Health Management Corp., PA.
Health Status in Northcentral Philadelphia.
Final rept.
Aug 77, 329p
Available from Systems, Planning and Education Div., Philadelphia Health Management Corp., 530 Walnut St., Philadelphia, PA 19106.

Health status is evaluated in a 1977 study on the role of community development (CD) funded services. The purpose is to define health needs, status, resources, priorities, and CD-funded health services of significance for the area. Preevaluation activities such as refinement of the data classification system, data collection, analysis, and presentation, community consumer and provider participation and study strengths and limitations are considered. Overall assessment is based on demographic and socioeconomic status, personal health status, delivery system status, resources and use of the system, and community perceptions of health needs and priorities. Geographic profiles are provided for each of ten neighborhood groupings, as well as for Spanish-speaking areas and for eastern north Philadelphia. Findings indicate that CD-funded projects make high quality service generally available without great costs to contract institutions. Particular areawide health problems relate to nutrition, heart disease, cancer, hypertension, metallic poisoning, infant mortality, and inadequate prenatal care. Health systems problems are dependence on public funds, the aged, a shortage of home health services, a lack of health education, and a need for bilingual services and nonemergency transportation. It is recommended that the CD-funded health services be continued, that specific plans be made with each provider, that uniform contracting/audit/management plans be adopted for contracts, that new program objectives be defined and that contingency financing be developed. Eighteen maps, 20 tables and 3 exhibits are furnished.

HRP-0024504/3 Not Available NTIS
Stephen F. Austin State Univ., Nacogdoches, TX.
Study of Consumer Perceptions Related to Nursing.
Beverlyanne Robinson. 1978, 5p
Pub. in Nursing Leadership v1 n1 p14-18 Jun 78.

This consumer survey involved the application of marketing to evaluate consumers' needs and wants in developing new or improved nursing services. The marketing approach was tested with 300 consumer respondents in two shopping areas located in a Southwestern metropolitan city. A questionnaire on consumer conceptualization of nursing services, the influence of marketing variables, and demographic characteristics was used. Consumers' perceptions of nursing service encompassed the ideal as well as the actual. Consumers reported a preference for traditional services, including physical care, administering medications, and teaching patients to care for themselves. Newer types of services, such as physical examinations, patient advocacy, counseling, and assistance in locating resources, were less accepted. Factors affecting the decision to obtain services were the needs for information, comfort measures, and monitoring activities. Health status was influential in the selection of single or multiple activities. Restraints on care from nurses involved: (1) the nurse was too busy; (2) the hospital and/or the physician limited nursing activities; and (3) the nurse was not educationally prepared to perform some functions. The marketing variables of product and place were significant in categorizing the population of consumers and in the provision of desired services. Demographic characteristics were also important. Implications of the findings are discussed, and recommendations for additional study are offered. The questionnaire is included.

HRP-0026162/8 Not Available NTIS
Third Party Associates, Inc., Oakland, CA.
Introduction to Policy for Health Educators.
Paul R. Mico. 1978, 11p
An earlier version of this paper was presented at the International Conference on Health Education, Ottowa, Canada, August 29-September 3, 1976.
Pub. in Health Education Monographs v6 Suppl 1 p7-17 1978.

The relationship between the health policymaking process and health education is assessed. The role of health educators in the development of policy in the field of health education is discussed. The policy process is defined to include steps and procedures by which key people of constituencies and agencies who are to be affected by policies become actively involved in policy development and analysis. Policy implementation is the organization and utilization of a system of procedures and processes that link policies with their goals, programs, and services. Health education is viewed as a process of planned change; it is concerned with behavior contributing to health. An overview of the methodology of policy analysis and development, vehicles and forms of policy, policy characteristics, and tests of policy effectiveness is presented. Key elements in the policy development process are identified as leadership, information, problemsolving, and agreement. Effective policy meets three tests: political relevance, operational relevance, and logical consistency. Two strategies are proposed for the placement of health educators where they can influence policy-level decisionmaking. One involves continuing the development of national centers of influence and the other involves the development by health educators of policymaking structures within their State or local agencies.

HRP-0026645/2 Not Available NTIS
California Univ., Los Angeles. School of Dentistry.
Dental Education in the United States, 1976. Part II. Curriculum Study Findings.
Andrew D. Dixon. 1978, 7p
See also Part I, HRP-0026644; Part III, HRP-0026646.
Pub. in Jnl. of Dental Education v42 n5 p237-243 May 78.

Core data relevant to major components of a dental curriculum are presented and evaluated to indicate the need for and the means of changing dental curriculums. Presently, the dental curriculum permits students to bypass instruction in the basic sciences, clinical subjects, and behavioral and social sciences to some degree, but deviation from the traditional curriculum time such as early graduation of outstanding students is rare. Instructional objectives are increasingly used to delineate curriculum topics in line with desired dental practice standards. Most objectives are in the cognitive category, but some psychomotor objectives and affective objectives are included. Although comprehensive medical care of the dental patient is considered an objective, there is a lack of curriculum support. Increased oral biology coursework is an attempt to integrate basic science with clinical practice. There is evidence that evaluation of students in most dental schools is inadequate, with a lack of standards for judgement and insufficient feedback to students. The evaluation of teaching staff is even more fragmented by local policies and standards. It is concluded that the lack of a typical or standard dental curriculum may be beneficial rather than harmful in improving such curriculums relative to other medical professional programs.

HRP-0026655/1 Not Available NTIS
State Univ. of New York at Buffalo. School of Medicine.
American Indian Medicine and Contemporary Health Problems. Part III, American Indians -- New Opportunity for Health Care.
Henry P. Staub. 1978, 5p
See also Part I, HRP-0026653; Part II, HRP-0026654; Part IV, HRP-0026656. Presented at the Annual Eastern Regional Conference on the Native American (6th), State Univ., of New York, Coll. at New Paltz, May 4, 1977.
Pub. in New York State Jnl. of Medicine v78 n7 p1137-1141 Jun 78.

Opportunities for improving the health care of American Indians are explored, with emphasis on Indians living in New York State. The unique and common health problems of Indians are described. Recurring diseases found in the Indian population include genetic disease and conditions, gallbladder disease, hepatitis, diabetes, methemoglobinemia, jaundice in infants, and otitis media. Dysentery (both amoebic and bacillary) is 46 times more prevalent among Indians than in the total U.S. population. These epidemiological patterns are partially attributed to health and sanitation problems, as well as to limited availability of health care services. Infant mortality rates are also consistently higher than for whites, but statistics on Indian neonatal mortality are confused and often unrecorded. Recommendations made to improve health care delivery to the Indians include providing incentives for native health personnel to work in rural locations, installing local health centers and clinics, and establishing tribal health boards to plan and supervise health programs.

HRP-0026656/9 Not Available NTIS
State Univ. of New York Coll. at Geneseo. Dept. of Anthropology.
American Indian Medicine and Contemporary Health Problems. Part IV, Diabetes and Perception of Diabetes -- Among Seneca Indians.
Russell A. Judkins. 1978, 4p
See also Part I-Part III, HRP-0026653 -- HRP-0026655. Presented at the Annual Eastern Regional Conference on the Native American (6th),

State Univ. of New York, Coll. at New Paltz, May 4, 1977.
Pub. in New York State Jnl. of Medicine v78 n4 p1320-1323 Jul 78.

The high incidence rates of diabetes mellitus among American Indian populations and perceptions of the disease among the Seneca Indians of New York State are investigated. Among adults on the Seneca Nation of Indians Cattaraugus and Allegany Reservations, diabetes is common. The relationship between changing dietary patterns and the increased level of diabetes in these areas is explored. Factors investigated as predisposing the Senecas to diabetes include obesity, dietary habits, personality patterns, and behavioral attitudes. It is observed that obesity is a norm in the Seneca population, apparently caused by high caloric intake and a comparatively sedentary lifestyle. It is shown that Senecas' views of diabetes are traditional and fatalistic, but that Senecas with the disease usually seek and are successful in treatment with Western medicine. Philosophically, they remain committed to Indian perceptions about the cause and cure of the disease. This dichotomy permits the Senecas to face the disease as a serious health problem while retaining their cultural underpinning of 'being Indian'.

HRP-0026723/7 Not Available NTIS
Ohio State Univ., Columbus. Center for Nursing Research.
Developing Staff Research Potential. Part I.
Joanne S. Stevenson. 1978, 3p
See also Part II, HRP-0026724.
Pub. in Jnl. of Nursing Administration v8 n5 p44-46 May 78.

Planned change to overcome the resistance of nurses to research development on their behalf is addressed. The development of staff research potential encompasses a philosophy about the development of nurses and nursing students who exhibit an aptitude for research, a framework of planned change to guide nurses from the stage of resistance to research into the stage of committment to it, the presentation of selected strategies and tactics for change, and the derivation of a peer group strategy to effect major attitudinal adjustments. If students show promise in cognitive and psychomotor dimensions usually related to successful research performance, they should be identified early in the undergraduate program and provided with research assistantships, group and independent study opportunities, and formal research courses. The use of leveling and confrontation is predicated on the belief that educators, administrators, and staff developers are responsible for promoting growth rather than for ignoring, excusing and reinforcing stagnation. Lewin conceptualizes the process of planned change in three stages: unfreezing, changing, and refreezing. Forces affecting the changing stage are group dynamics, role relationship alterations, shared examination of childhood stereotypes about women and nursing, and reinforcement due to success achieved by beginning investigators. Peer group activities are recommended for implementing the research process.

HRP-0026745/0 Not Available NTIS
Intermountain Regional Poison Control Center, Salt Lake City, UT.
One Year's Experience in a Regional Poison Control Center -- The Intermountain Regional Poison Control Center.
Anthony R. Temple, and Joseph C. Veltri. 1978, 13p
Pub. in Clinical Toxicology v12 n3 p277-289 1978.

A description of the Intermountain Regional Poison Control Center in Salt Lake City, Utah, is presented. Basic statistical and epidemiologic data and management experiences are reported. In 1975, the center received 16,127 calls; the analysis reports on 15,878 of these cases. The type of calls received concerned poisoning incidents (79.8 percent), and information (20.2 percent). Of the poisoning cases, 87.2 percent were accidental in nature, 8.1 percent suicidal or intentional, 4.6 percent drug abuse, and 3.4 percent environmental or industrial exposures. The majority of information calls were toxicology or drug information requests, but some were requests for medical information and veterinary information. At the time of initial contact, an assessment of severity was made considering the toxicity of the agent(s), the amount involved, mode and type of exposure, and other relevant historical data. Fewer than 10 percent of the calls were deemed of sufficient concern to be referred to an emergency room or a physician for care. Additional information is reported on poisonings during 1975 which involved children 5 years of age and under (over 66 percent) and suicides and intentional self-poisonings.

HRP-0026885/4 Not Available NTIS
American Hospital Association, Chicago, IL. Dept. of Health Planning.
A Recipe for Action, P.L. 93-641.
Carol A. Lively. 1978, 5p
Pub. in Hospitals, Jnl. of the American Hospital Association v52 n14 p65-68, 124 16 Jul 78.

The provisions of the National Health Planning and Resources Development Act of 1974 are reviewed to indicate the mechanisms by which local involvement in restructuring the U.S. health care delivery system is guaranteed. From a historical point of view, planning of health care delivery has been carried out over a long period of time, but with little coordination among various groups and agencies. The results of this piecemeal approach have been inadequate or poorly distributed money, manpower and facilities. Under the new law, Federal responsibilities include setting guidelines on national health policies and goals, including standards for appropriate supply, distribution, and organization of health resources, e.g., primary care for underserved areas. State responsibilities are to conduct planning activities; prepare, implement, and supervise State health plans; provide for capital expenditure review and administration of certificate-of-need programs; and review and evaluate results. State consumer groups are also required to participate. Local responsibilities, through health systems agencies, include planning, development, and regulation of specific activities and projects. Potential problems in the areas of development of planning guidelines, appropriateness review, certificate-of-need, representation, and codes and standards are discussed.

HRP-0026935/7 Not Available NTIS
Newcastle-upon-Tyne Univ. (England).
Environmental Protection -- New Aims and Real Costs.
Peter C. Isaac. 1978, 7p
Dunn Lecture.
Pub. in Chemical Industry v14 p497-503 Jul 78.

This article contends that scientists and engineers must take a wider view of their task and their environment and should take a major role in developing a climate of opinion pressing for environmental protection and conservation of resources. Three related themes are explored: (1) that it is no longer possible to think of the environment as a collection of discrete subsystems in which adjustments can be made without affecting other subsystems; (2) that the scientist or engineer must be as concerned with the purpose and consequences of his work as he is with the technical aspects; and (3) that the public engineer must consider both the financial costs of his proposals and the demands made on real resources, some of which are nonrenewable. The areas explored include the development of public health engineering, an example of a control agency ignoring careful monitoring and scientific interpretation of observations, the politics of the environment, and four stages at which resources can be conserved and the environmental impact minimized. A new direction in environmental protection is recommended: to apply scientific and engineering effort to minimize the creation of pollution rather than to eradicate its effects. A basic savings in nonrenewable resources is anticipated should this approach be adopted.

HRP-0027029/8 Not Available NTIS
Bureau of Epidemiology, Atlanta, GA. Family Planning Evaluation Div.
Public Health Need for Abortion Statistics.
Jack C. Smith, and Willard Cates. 1978, 4p
Pub. in Public Health Reports v43 n2 p194-197 Mar-Apr 78.

Arguments are presented in favor of the public health need for abortion statistics. Health statistics of all types are considered essential for the purposes of identifying health problems, assessing their magnitude and making recommendations for eliminating them. The rationale for statistics is that in their absence, there would be no basis for rational decisionmaking concerning health care effectiveness and efficiency. The role of the Center for Disease Control (CDC) in documenting the epidemiology of legal abortion is described. The CDC abortion surveillance program involves three activities: compiling data on the medical and demographic characteristics of women having induced abortions in the United States; coordinating a multicenter study to determine morbidity risks associated with abortion; and conducting epidemiologic surveillance of abortion-related deaths to assess their preventability. The public health impact of abortion is discussed, as are some public health uses for abortion statistics. Such data provide a basis for legislative and judicial decisions having national and local impact.

HRP-0027033/0 Not Available NTIS
Duke Univ., Durham, NC. Dept. of Surgery.
Role of the Physician's Assistant and the Plastic Surgeon.
Paul S. Toth, Kenneth L. Pickrell, and L. K. Thompson. 1978, 2p
Pub. in Southern Medical Jnl. v71 n4 p430-431 Apr 78.

A physician's associate program was founded at Duke University in 1965 with a view toward training ex-military corpsmen. Initially, the training focused on general medicine. Later, in response to interests in the physicians' assistants by specialists on the university medical school staff, the preclinical portion of the program was expanded to include all disciplines, including plastic surgery. In addition, persons other than ex-military corpsmen were accepted. The entire program comprises 24 continuous months of training (9 months of basic medical science and 15 months of clinical medical science). In the surgical specialties, the basic principles of medicine and surgery overlap. On plastic surgery rotation, as on other surgical rotations, the students function essentially as medical students and junior interns. House staff instruct them and use their developing skills in a variety of tasks. In the case of plastic surgery, the physician's assistant may see new patients or followup patients, perform admission histories and physical examinations, order routine laboratory tests, dictate discharge summaries, make rounds on postoperative patients, follow burn patients, change dressings, and evaluate wounds. It is concluded that the plastic surgeon's physician's assistant literally functions as an extension of the physician in knowledge and skills.

HRP-0027034/8 Not Available NTIS
Rutgers - The State Univ., Newark, NJ. Coll. of Nursing.
Class Size and Cost in Associate Degree Nursing (ADN) Programs.
Alice C. Boehret, and Ann Larowe. 1978, 3p
Pub. in Nursing Outlook v26 n6 p389-391 Jun 78.

Effective utilization of faculty time and college resources are noted as advantages in increasing admissions to associate degree nursing (ADN) programs. To determine if ADN programs are efficient and effective, class size was examined. A small class was defined as 49 or less students admitted per year. This is costly and does not utilize nursing faculty to the fullest extent. Of all ADN programs identified in 1976, 23.9 percent (154 of 644) admitted 49 students or less per year. Of the 154 programs, 10 were financed by private funds and 144 by public or tax revenues. The majority were in the West, Midwest, and South. The programs admitting 49 or less students decreased by 2.8 percent from 1973 to 1976, according to National League for Nursing statistics. Even with this decrease, however, there was a large number of ADN programs with small classes in 1976. A possible reason is the growth of ADN programs since 1968. Factors important in class size and ADN program cost are declining employment opportunities for graduates, faculty utilization, and college resource utilization. Realistic problems to be faced with increasing enrollment in ADN programs pertain to the time needed by teachers for grading examinations, evaluation conferences, and individual conferences. It is proposed that cost-effective enrollment levels can be reached through the review of

admission statistics. Supporting data on ADN programs with small class sizes are tabulated.

HRP-0027139/5 Not Available NTIS
Department of Health, Education, and Welfare, Washington, DC.
Management Model for the Implementation of Omnibus Legislation -- A Case Study From the U.S. Public Health Service.
Dorothea E. deZafra. 1978, 5p
Pub. in Public Management Forum p276-280 May-Jun 78.

Examples from the Federal Government are used to explore the subject of omnibus legislation intended to change processes of internal Government operations. The generic characteristics of such laws as the 1972 Equal Opportunity amendment to the Civil Rights Act of 1974 and the Privacy Act of 1974 that interfere with effective implementation are considered and the functional management approach to implementation developed in the Public Health Service is explained. The problem for management was that a complex, vague statute addressing a new field of law (the Privacy Act) was to be implemented. A functional implementation strategy was devised to open new and coordinate existing channels of communication, maximize resources in appropriate technical expertise, and directly involve the line management officials responsible for implementing the act in their programs. A roundtable management model was used to maximize communication and to minimize power dissension. The members' self-interests in implementing the act were emphasized, and immediate practical problems were posed for the members' recommendations and solutions. The responsible manager maintained a low profile to encourage diverse viewpoints and expertise.

HRP-0027146/0 Not Available NTIS
Veterans Administration, Washington, DC.
Future of the Veterans Administration Hospital System -- A Realistic Appraisal.
John D. Chase. 1978, 4p
Pub. in the New England Jnl. of Medicine v299 n3 p148-151 20 Jul 78.

An appraisal of the probable future of the Veterans' Administration (VA) hospital system in the United States is presented. In its report on health care for veterans, the National Academy of Sciences made the assumption that the United States will soon have a national health service and recommended that the VA's medical services be phased into the national system. Reactions to this recommendation have been vehement, both pro and con. Critics of the recommendation see it as diminishing the quality and quantity of health care services presently available to veterans with and without service-connected disabilities. Proponents of the recommendation believe that the national health service system should incorporate such separate health care systems for reasons of economy and that the clients of the VA system would not be penalized by the incorporated service. Notwithstanding the recommendation, present prototypes of national health insurance under consideration do not require incorporation of the VA system. In fact, the provisions and coverage for care under the VA system differ from those proposed for the national health insurance system. The VA system also is a source of information and experience in interfacing with the private sector health care delivery system. It is concluded that the role of the VA will change to some extent and may be somewhat reduced. The system will, however, continue to provide quality care to veterans.

HRP-0027399/5 Not Available NTIS
Royal South Hants Hospital, Southhampton (England).
Continuing Care Unit.
Brian Sartain. 1978, 5p
Pub. in Cancer Nursing v1 n4 p291-295 Aug 78.

Factors to consider when drafting operational policies for continuing care units in hospitals are examined. In England, a continuing care unit is a variation of the hospice concept for terminally ill patients. Patients are accommodated in single bedrooms or multiple-bed rooms with adjoining ancillary services. The continuing care unit at the Royal South Hants Hospital in Southampton, England, is the focal point of a service designed to care for patients suffering from cancer who have reached a stage where active treatment to prolong life is no longer appropriate. Support and care are offered to patients and their relatives to cope with the reality of dying, both in the unit and in the home environment. The services of the unit are community-oriented and rely heavily upon successful liaison between staff from many health and social service agencies and voluntary agencies. Three categories of patients are admitted to the unit: patients who have only a few weeks or months to live and whose social circumstances are such that terminal care in a hospital setting is essential, patients in severe pain or distress admitted for a short period for assessment and recommendations about subsequent management in their homes, and patients admitted on a short-term basis to relieve relatives. A consultant physician directs the unit. Staffing levels relative to medical and nursing, housekeeping, rehabilitation, recordkeeping, pathology, pharmacy, portering, and social work services are specified. Consideration is given to such supporting services as the use of paramedics, community involvement, and communications.

HRP-0027400/1 Not Available NTIS
Illinois Univ. at Urbana-Champaign.
Consolidation of Community Hospitals.
Bruce R. Neumann, D. Michael Harms, and Daniel K. Bloomfield. 1978, 11p
Pub. in Jnl. of Community Health v4 n1 p73-83 Fall 1978.

The benefits and potential disadvantages of community hospital consolidation are explored. Evidence indicates that community hospital costs can be reduced through the consolidation of some or all hospital services. The consolidation of health services ranges from cooperative agreements between institutions regarding specialized equipment to the complete merger of institutions into a new entity at a new physical location. Between these extremes are shared services, affiliations, cooperatives or joint ventures, satellites, multiple units under single management, and mergers of management and services. The benefits of consolidation relate to an increase in the quality of care and to the reduced costs of service. Economic benefits are concerned with economies of scale and reductions in capital costs. Identifiable economies of scale are attributed to a reduction of excess capacity, savings through quantity discounts on large purchase orders, specialization of personnel and equipment in specific areas, more available sources for capital financing or lower costs of capital, and greater stability of operations. Potential advantages of offsite hospital construction are noted. A major obstacle to consolidation involves the social costs of overcoming the inertia of corporate structures that prefer to be independent. Economic risks and the possibility of increased costs mitigate against consolidation.

HRP-0027402/7 Not Available NTIS
Choosing the Circumstances of Death.
Sandra M. Mikolaitis. 1978, 6p
Pub. in Forum v2 n3 p18-23 1978.

The hospice approach to the care of terminally ill patients is described. When this approach is used, medical treatment of the illness is terminated and attention is focused on helping the patient meet death without pain and under the most normal circumstances possible. Advocates of the approach emphasize preserving the patient's quality of life. Irrespective of the type of operation, hospices share such characteristics as: emphasis on pain control rather than disease control; the provision of medical direction by a physician; use of an interdisciplinary team (physician, nurse, social worker, therapist, and consultants); 24-hour coverage; volunteers as an integral part of the team; care of the family after the patient's death; and coordination of home care and inpatient programs by an autonomous hospice administrator. Most U.S. hospices use a mixture of morphine or methadone, codeine, alcohol, chloroform water, and syrup to control pain. In England, inpatient care is more prevalent than home care. Inpatient hospices in the United States are used mainly in three circumstances: when there is no person in the patient's home to assist in care, when the patient's pain and symptoms must be closely monitored, and when the family needs rest from the physical and emotional stress of caring for the patient at home. The operation and effectiveness of Hospice, Incorporated, in the United States and its bereavement program are detailed. Planned DHEW studies to evaluate the hospice as an alternative method of care for terminally ill patients are noted.

HRP-0027403/5 Not Available NTIS
Albany Medical Coll., NY. Dept. of Preventive and Community Medicine.
Canadian Approaches to Health Policy Decisions -- National Health Insurance.
Gordon H. Hatcher. 1978, 9p
Pub. in American Jnl. of Public Health v68 n9 p881-889 Sep 78.

The experience of Canada under universal health insurance and its implications for the United States are considered. Five Canadian health policy decisions and their relevance to the United States are described: (1) universal access to care with dignity; (2) a data base that enables program managers to monitor the utilization and cost of health care; (3) integration of health care system controls; (4) reduction in hospital bed supply and utilization; and (5) manpower. It is concluded that: major health policies in Canada have been delineated primarily in relation to dialogue or competition between various political parties; that health policies have been essentially pragmatic and incremental, not based on a broad ideological or systems approach; and that the Canadian approach to universal health insurance has been the cornerstone of most other major health policies. Universal health insurance in Canada, operated by the Government, costs about 75 percent less to administer than the coinsurance public-private system in the United States. Health care in Canada costs about three-fourths as much as in the United States.

HRP-0027404/3 Not Available NTIS
Washington Univ., Seattle. Dept. of Rehabilitation Medicine.
Cancer Rehabilitation -- Assessment of Need, Development, and Evaluation of a Model of Care.
Justus F. Lehmann, Joel A. DeLisa, C. Gerald Warren, Barbara J. deLateur, and Patricia Sand Bryant. 1978, 10p
Pub. in Archives of Physical Medicine and Rehabilitation v59 n9 p410-419 Sep 78.

This study was initiated to determine the extent of rehabilitation problems in a population of cancer victims, to assess the need for rehabilitation services, to identify gaps in the delivery of rehabilitation care, and to determine why therapeutic intervention was less than optimal. A randomly selected sample of 805 patients was screened, with rehabilitation problems identified by the organ system involved (skeletal, vascular, respiratory, neuromuscular, skin, and head and neck). A program of optimal intervention was recommended for each patient, and this program was compared with actual rehabilitation services received. Differences between recommendations and treatment received were defined as gaps in service delivery. A model of rehabilitation care for cancer patients was designed, implemented, and evaluated. After the model had been implemented for 7 months, its effectiveness was assessed by repeating initial screening with a randomly selected sample of 438 patients referred to the same hospitals in the previous screening. Psychological problems were frequently encountered and seemed to be more severe in patients with physical disabilities. The findings indicate a need for psychosocial support services and a comprehensive rehabilitation team with psychological management capability where cancer is associated with significant physical disability. Primary barriers are the failure to identify patients' problems and/or the lack of appropriate referral by physicians unfamiliar with the concept of rehabilitation. Financial support came primarily from private insurance, Medicare, and Medicaid. Supporting data are provided.

HRP-0027559/4 Not Available NTIS
Profits in Medicine -- A Context and an Accounting.
Gelvin Stevenson. 1978, 14p
Revised Edition.
Pub. in International Jnl. of Health Services v8 n1 p41-54 1978.

This article is concerned with estimates of the relative and absolute sizes and growth trends of the

profit and nonprofit sectors of the U.S. health care industry. It is noted that the health care industry is comprised of profit and nonprofit, public and private sectors. This interaction is said to have strong implications. The subsectors of the health sector are grouped into three categories: production of material goods, service delivery, and financing. The profit sector is said to have a monopoly on all aspects of material production. Problems created by the profit sector which often have to be corrected by the nonprofit sector are examined. A comprehensive overview of the size and growth of the components of the health care system is provided. Figures and tables highlight the data. The profit sector is shown to be growing absolutely and relative to the health industry as a whole. Data on the profit sectors are provided. It is explained that if profit sectors continue to grow, they will become more and more dominant over the nature, form, and activities of the overall health industry. A distortion of human needs in the health system will result. The profit sector's political power will increase as well. Government regulation will then be inevitable. The results of Government regulation are examined.

HRP-0027654/3 Not Available NTIS
San Francisco Univ., CA.
Learning Needs of Foreign Nurses.
Connie L. Curran. 1978, 3p
Pub. in Supervisor Nurse v9 n8 p30-32 Aug 78.

Learning needs expressed by graduates of foreign nursing programs were compared with those of their American-educated colleagues. All nurses employed in six hospitals in the Chicago, Ill., area were requested to complete a questionnaire indicating their participation in various continuing education activities and to rate courses on various subjects as very important, somewhat important, and not important. The responses of 527 domestic graduates and 168 foreign graduates were compared using statistical analysis techniques. On 8 of 14 suggested course topics for continuing education activities, (team nursing, legal aspects of nursing, budget and unit finance, trends in nursing, nursing care planning, patient teaching, foreign language, and interviewing techniques), foreign graduates differed significantly from domestic graduates. Foreign graduates felt team nursing, budget and unit finance, trends in nursing, foreign language, interviewing techniques, and legal aspects of nursing were more important for inclusion in continuing education than did domestic graduates. Patient teaching was rated as more important by domestic graduates. In the area of continuing education participation, spending money for educational materials was the only activity in which domestic and foreign graduates differed significantly. The implications of the findings are considered in relation to learning needs of foreign graduates of nursing programs and the provision of appropriate learning resources. Supporting data are provided.

HRP-0027772/3 Not Available NTIS
American Medicorp, Inc., Philadelphia, PA.
Increasing a Hospital's Market Share.
David D. Karr. 1977, 3p
Pub. in Hospitals, Jnl. of the American Hospital Association v51 p64-66 1 Jun 77.

A discussion is provided of American Medicorp, Inc., and its strategy for increasing a hospital's market share. It is noted that American Medicorp, which owns 37 hospitals and manages 12 others around the country, views each hospital as an active participant in the health care process, rather than just a passive link between the physician and patient. The first step American Medicorp takes in determining a community's present and future health care needs is to analyze the existing health care system. The analysis considers service area, population, neighborhood economics, health manpower availability, and utilization of health services. Marketing to physicians is begun after the completion of the survey work. A discussion of strategies implemented at a Massachusetts specialty hospital (Braintree Hospital) and a 50-bed Washington hospital (Allenmore Hospital) that was expanded to meet increased demand is provided. It is pointed out that good relations with patients and professionals are the bedrock of American Medicorp's marketing efforts, but these are not separated from other functions. Marketing is said to be turning normal hospital activities into advantages. The Braintree and Allenmore Hospitals are cases in point.

HRP-0027808/5 Not Available NTIS
World Health Organization, Geneva (Switzerland).
Research on Birth Control Technology.
Alexander Kessler, and Constance C. Standley. 1978, 6p
Pub. in Interdisciplinary Science Reviews v3 n3 p196-201 1978.

A discussion is provided of the World Health Organization's (WHO's) Special Programme of Research and Research Training in Human Reproduction. Scientists from 69 countries (45 of them developing countries) are involved in the program. The disciplines represented include reproductive biology; obstetrics and gynecology; organic chemistry, polymer chemistry, phytochemistry and biochemistry; pharmacology; toxicology; veterinary sciences; endocrinology; bioengineering; pathology; immunology; teratology; epidemiology; sociology; psychology; anthropology; statistics; and operations research. General issues of acceptability of family planning programs are considered. It is pointed out that a fertility regulating method, in addition to being safe and acceptable must be easy to provide. This is said to be particularly important for developing countries with minimal health infrastructures and widely dispersed rural populations. Different approaches to family planning services are examined. A major effort in the WHO program goes into building up self-reliance in developing countries for research on fertility regulation through the strengthening of their institutions and through a research training effort. The WHO program is primarily supported by voluntary contributions from member States.

HRP-0027846/5 Not Available NTIS
Multnomah County Dept. of Human Services, Portland, OR.
Physician Assistants and Nurse Practitioners -- Their Impact on Health Care Access, Costs, and Quality.
David Lawrence. 1978, 11p
Pub. in Health and Medical Care Services Review v1 n2 p1, 3-12 Mar-Apr 78.

Literature regarding the impact of physicians' assistants (PA's) and nurse practitioners (NP's) on health care access, costs, and quality is reviewed. Materials on increased use of PA's and NP's and on the development of appropriate training programs are outlined. Impact studies relate to access; geographical and specialty distribution; services available for a variety of practice settings; consumer acceptance and patients' attitudes and behaviors; and employment, care purchase, and manpower production costs. Literature on quality of care is extensive, but limited to particular settings. The overview suggests that NP's and PA's are more likely than physicians to be found in rural, inner-city, town, and primary care ambulatory settings, that patients of NP's and PA's have increased, but with no clear delineation of impact factors, that acceptance of NP's and PA's by patients is high, that costs of NP's and PA's to their employers are offset by revenues, that training costs are below those for physicians but are probably passed on to the public in addition to physician training costs, that costs to patients are as yet undefined, and that use of NP's and PA's does not affect outcome quality, although the relationships between setting and training variables and quality, or between care content and outcome are uncertain.

HRP-0027860/6 Not Available NTIS
McGill Univ., Montreal (Quebec).
On the Cost of National Health Insurance in Quebec.
Lee Soderstrom. 1978, 6p
Pub. in Inquiry v15 n3 p284-289 Sep 78.

Neither the large increases in the number of Canadian physicians during the 1970's nor the reported increase in total Canadian health expenditures can be attributed solely to the introduction of Medicare in November 1970. Four factors contributed to the increased number of physicians: the relatively higher incomes resulting from Medicare; the elimination of the citizenship requirement for licensure in 1970; the fact that steps taken in the mid-1960's to expand medical education began to bear fruit in the late 1960's and early 1970's; and the possibility that part of the increase may reflect data problems rather than an actual increase in the total supply of practicing physicians. An accelerated rate of increase in average expenditure per physician can probably be attributed to Medicare. Some important circumstances which caused Quebec's cost increases do not exist in the United States, e.g., the relatively low proportion of the Quebec population that had some sort of medical care insurance prior to Medicare (estimated at 49 percent). Therefore, if national health insurance were to be initiated in the United States, the resulting cost increases would be much lower than those which occurred in Quebec.

HRP-0027866/3 Not Available NTIS
Methodist Hospital of Indiana, Inc., Indianapolis.
Joint Planning -- How a Hospital and a City Carried It Off.
Douglass Seaver, and Thomas Dwyer. 1978, 5p
Pub. in Hospitals, Jnl. of the American Hospital Association v52 n18 p67-71 16 Sep 78.

Both Methodist Hospital of Indiana and the City of Indianapolis are benefiting from a joint long-range project involving development of the hospital and the surrounding inner-city neighborhood. The hospital's three major concerns were: (1) determining the best plan for accommodating its physical growth and expansion in an urban area; (2) attracting physicians, patients, and employees; and (3) demonstrating sensitivity to its impact on its neighbors in terms of land values, the density of land use, and the ecological environment. Three groups were involved in the joint planning process -- the city's Department of Metropolitan Development, a planning and architectural firm, and the hospital. Public meetings were held to share information with community members and seek their perceptions about the area's problems and assets. In general, the most significant problem identified was the existence of vacancies in the residential and business sections which produce an appearance of deterioration and tend to prohibit reconstruction and new development. Methodist Hospital has committed itself to preserving the multiuse character of the vicinity and defining limits for its own future growth. It is concluded that hospitals have an obligation to consider the community in their long-range planning.

HRP-0027878/8 Not Available NTIS
Clinical Research Inst. of Montreal (Quebec).
Health Care and Research in Canada, 1978. Part II.
Jacques Genest. 1978, 5p
See also Part I, HRP-0027877.
Pub. in Canadian Medical Association Jnl. v119 n6 p614ff 23 Sep 78.

Annual expenditures for health care in Canada, although increasing in absolute dollars spent, have declined as a percentage of the gross national product from 39 percent in 1970-71 to 34 percent in 1976-77. The most severely affected sector has been biomedical research under the Medical Research Council of Canada (MRC). The MRC's budget has increased an average of only 5 percent during the last 6 years, despite double-digit inflation, a tripling of the cost of scientific instrumentation, and a doubling of the salaries of technical personnel. As a result, over 400 biomedical researchers have left the field. Four solutions are offered to solve the problem. First, the medical profession must be adequately represented on the boards and commissions that set policy and approve budgets. Currently, such boards are composed primarily of civil servants who lack any medical expertise. Secondly, the development of medical technology must be encouraged and the number of beds in teaching hospitals must be expanded. Third, the method of teaching in the medical schools must be modified to emphasize clinical skill, judgment, and bioethics, rather than the trade aspects of the profession. Fourth, biomedical research must receive increased financial support.

HRP-0027885/3 Not Available NTIS
Saint John Medical Center, Tulsa, OK.
Energy Management -- Total Program Considers All Building's Systems.
Gary J. Blan, and Keith H. Browne. 1978, 6p
Pub. in Hospitals, Jnl. of the American Hospital Association v52 n18 p121ff 16 Sep 78.

implementation of energy conservation strategies has resulted in estimated savings of $2 million over a 5-year period at St. John Medical Center in Tulsa, Okla. In developing its total energy management program, the hospital stressed the continuance of high-quality care; the integrity of necessary functions could not be sacrificed. The expertise of outside consultants was utilized to ensure integration of energy systems with working staff schedules. Its program was divided into three phases: (1) survey and audit; (2) an in-depth study of heating, air-conditioning, light and power systems, and other components; and (3) the construction phase to implement changes. Automatic scheduled fan shutdowns and lighting level reductions were then developed. A reduction in energy usage of over 600,000 kilowatt hours (or 10 percent of total usage) was effected in 2 months. Electrical consumption was reduced via reheat coils and variable-volume chilled water operation. Boiler economizers helped to decrease gas usage. In the future, St. John Medical Center will face a continuing process of implementing and controlling its program. It is committed to providing high-quality health care while meeting the challenges of increased cost, reduced availability, and possible governmental controls on energy.

HRP-0027907/5 Not Available NTIS
Brigham Young Univ., Provo, UT.
Professional Interaction in Academic Health Centers.
Gordon J. Christensen. 1978, 9p
Pub. in Jnl. of Nursing Education v17 n8 p11-19 Oct 78.

The relationship between administrative structures and attitudes of students, faculty, and administrators toward interaction in the dentistry, medicine, and nursing faculties of health centers is investigated. Health centers have the advantage of shared classrooms and teachers, as well as of savings in time and salaries of faculty, elimination of duplication, and professional interaction. The investigation involves a preliminary questionnaire to all medical schools, a pilot study, an in-depth study of five health centers based on 2,159 questionnaires and interviews, and complex data variance analysis. Results indicate that attitudes and behavior characteristics of various professions, schools, and subgroups differ significantly, that the administrative structure affects both behavior and attitudes toward interpersonal behavior, that nurses are most supportive of interaction and physicians least, and that students engage in the least interaction, and administrators in the most. It is concluded that desirable interaction among health professionals can be encouraged by common classrooms, equipment, and teachers, by geographical concentration of institutions, by one administrative coordinator (not the medical dean) for all schools, by establishment of a council of deans, by multidisciplinary team teaching, and by interdisciplinary social events, research, and student and faculty government. Two tables and a short bibliography are provided.

HRP-0027920/8 Not Available NTIS
'Expanded-Role' Nursing Hits the Hospitals.
Linda Stanley. 1978, 5p
Pub. in RN v41 n10 p55-59 Oct 78.

The use of expanded-role nurses to take the pressure off crowded emergency rooms is explicated. The nurse practitioner (NP) has almost complete control of patient care: the NP judges how much patient history is necessary for particular cases, conducts examinations, orders tests, decides on a diagnosis and whether to consult a physician, and discusses difficult cases with the physician. Limitations are imposed on nurses prescribing medications, but they may make suggestions; the practitioner is required to work under the supervision of a physician, although the definition of supervision varies. The nurses' new status calls for adjustment in the nurse-physician relationship and overcoming of staff nurses' resistance. Advantages include additional attention to patients' conditions, reduced waiting time, and improved continuity of care. A special training program at Allegheny Hospital with a 5-month didactic session for diagnosis and assessment skills and a 5-month preceptorship prepares nurses for acute treatment. It is cautioned that trainee nurses must be carefully selected, have 2 years of experience, a hospital sponsor, a physician sponsor, and must learn to strike a balance between confidence and caution.

HRP-0027924/0 Not Available NTIS
California Univ., San Francisco. Multipurpose Arthritis Center.
Costs of Rheumatoid Arthritis -- A Patient-Oriented Study of Chronic Disease Costs.
Robert F. Meenan, Edward H. Yelin, Curtis J. Henke, David L. Curtis, and Wallace V. Epstein. 1978, 7p
Pub. in Arthritis and Rheumatism v21 n7 p827-833 Sep-Oct 78.

To estimate the yearly costs to individuals with chronic diseases, 50 patients with Stage III rheumatoid arthritis, living in the San Francisco bay area, Calif., were surveyed. The costs were separated into direct medical costs and indirect costs due to changes in employment as a result of the disease. The direct medical costs were three times the national average and averaged $2,319, a major share of that being hospital costs, even though only 13 patients had been hospitalized. For the hospitalized group, the average medical costs were $7,077. For the nonhospitalized group, the figure was $647. Indirect costs due to lost income were at least three times the direct medical costs and averaged $7,711. Among other indirect costs were divorce or separation, changes in family structure and employment, and psychiatric disturbances. On the average, 58 percent of the medical costs were covered by insurance. Five tables provide details on the demographic characteristics of the study group and on the types of losses incurred. The patients were between the ages of 21 and 65.

HRP-0027962/0 Not Available NTIS
Pennsylvania Hospital, Philadelphia.
Chinese Health System Gets Down to Basics.
H. Robert Cathcart. 1978, 5p
Pub. in Hospitals, Jnl. of the American Hospital Association v52 n20 p69-73 16 Oct 78.

Health care delivery in China is discussed. Preventive and primary health care, rather than advanced medical technology, are stressed in China. An essential part of the Chinese system is the 'barefoot doctor', or physician extender. Typical 'barefoot doctors' are involved in basic public health sanitary duties, obtaining and maintaining good water supplies, promoting adequate human waste management, preventive health services, and immunization duties. They also make home visits, which are important to homebound citizens who may have chronic or acute health problems. Their educational background probably varies from at least 2 school years beyond the high school level to 2 years of education beyond 4 years of college. In 1965, Chairman Mao called on Chinese medical workers to combine their knowledge of both traditional and Western medicine and pharmacology and urged them to create a new unified system, incorporating such approaches as acupuncture and herbal treatments. Given China's focus on basic care at the rural level, much of the medical technology is behind that of the United States.

HRP-0028027/1 Not Available NTIS
Waterloo Univ. (Ontario). Dept. of Management Sciences.
Clinical Evaluation of Four Alternative Telemedicine Systems.
David W. Conrath, Earl V. Dunn, William G. Bloor, and Barbara Tranquada. 1977, 10p
Pub. in Behavioral Science v22 n1 p12-21 1977.

The results of the third phase of a research program focusing on problems and solutions associated with the delivery of primary health care to remote and sparsely populated areas are provided. Four alternative telecommunications systems used to deliver primary health care to remote populations were compared: hands-free telephone, still-frame black-and-white television, black-and-white television, and color television. The patient population was that of a large organization in northern Ontario. It is noted that more than 1,000 patients who came to the clinic for medical attention were examined by one of the telecommunications systems. They were also examined in the presence of a physician at the clinic. The clinic physician's diagnoses and patient management programs were used as the basis for comparison. No significant differences were noted. It is pointed out that there seems to be little to distinguish the effectiveness of the four systems when used for diagnostic consultations in remote areas. The least expensive mode would therefore be the most cost-effective.

HRP-0028137/8 Not Available NTIS
National Center for Health Services Research, Hyattsville, MD.
Status Consistency and Nurses' Expectations and Perceptions of Role Performance.
Norma L. Chaska. 1978, 9p
Pub. in Nursing Research v27 n6 p356-364 Nov-Dec 78.

The theoretical concept of status consistency and expectations and perceptions of role performance by nurses was studied. Four hypotheses were tested which relate nurses' educational, position and income levels to their expectations of nurses in varied roles, such as staff, private duty, industrial, or head nurse, and independent nurse practitioners. A 72-item status consistency index was employed to collect data on nursing roles, job satisfaction, attitudes toward nursing education and nursing practice, perceived influence of physicians on the role of nurses, and demographic variables. Of 303 study subjects, 180 graduated from diploma, 24 from associate, and 99 from baccalaureate nursing programs. Education, position, and income were statistically analyzed, and education was the most important determinant of consistency. The second and third study hypotheses were generally supported; a significant relationship existed between expectations and perceptions of role behavior and status consistency. The first and fourth hypotheses were not supported. No group had significantly higher expectations for nurses in the staff, nursing home administrator, head, public health, private duty, or industrial nurse roles, regardless of educational background; this may be due to a consistent idealization of the nursing role throughout nursing programs. Low-status-consistent nurses had higher perceptions of nurse educators, directors of nurses, supervisors and clinical specialists, than did high-status-consistent nurses. Tabular data on the study findings are provided.

HRP-0028138/6 Not Available NTIS
Western Interstate Commission for Higher Education, Boulder, CO. Regional Program for Nursing Research Development.
Development of a Research Tool -- Patient Indicators of Nursing Care.
Sophie J. Majesky, Mary H. Brester, and Karen T. Nishio. 1978, 7p
Pub. in Nursing Research v27 n6 p365-371 Nov-Dec 78.

The quality of nursing care, defined as the prevention of nursing care complications, was assessed using the Patient Indicators of Nursing Care (PINC) technique. In investigating treatment outcomes in the context of complications related to nursing care, it was determined that such complications could be either present or absent, either on admission to the health care setting or at the time of subsequent assessment. It was assumed that quality can be quantitatively identified, that physiological complications are observable, that the identification of change in a patient's status between two points in time can be documented, and that the incidence of complications and the quality of nursing care are related. Selected indicators of complications to discriminate between long-term patients and patients undergoing short-term elective surgery were infection, immobility, and fluid imbalance. A list of 27 indicators within these three broad categories was devised. The PINC was tested using a sample of 124 patients drawn from four health care settings (critical care units, general hospitals, extended care facilities, and nursing homes). The tool was reliable and easy to administer by nurses and required approximately 15 minutes per assessment. It is concluded that PINC has potential use in preventive aspects of nursing care with a broad population group having minimal diagnosis-related indicators. Supporting data are included.

HRP-0028139/4 Not Available NTIS
Ohio State Univ., Columbus. School of Nursing.
Evaluating the Performance of Nurses -- A Multidimensional Approach.
Patricia M. Schwirian. 1978, 5p

Pub. in Nursing Research v27 n6 p347-351 Nov-Dec 78.

A multidimensional scale of nursing performance is described in terms of its content, structure, validity, and reliability. Work on the development of the six-dimensional scale was carried out by the Ohio State University Research Foundation from 1974 to 1977. A set of 76 nurse behaviors incorporating 7 nursing performance areas was devised. The areas were: planning nursing care, implementing nursing care, evaluating nursing care, teaching, interpersonal relations, leadership, and professional development. Final data collection involved two instruments, one for nurse graduates and one for their immediate superiors. A total of 1,440 basic schools of nursing in the United States were classified according to program type, geographic region, and financial support. The final sample included 151 directors/deans of the schools. Of 3,000 nurse graduates, 914 returned usable questionnaires. A total of 587 supervisors returned questionnaires. Evaluation of performance on the 76 items proceeded along the 6 dimensions of the scale: leadership, critical care, teaching/collaboration, planning/evaluation, interpersonal relations/communications, and professional development. The findings indicated that the six-dimensional scale is flexible and reliable and that it can be used to obtain self-appraisals of the frequency and/or quality of nursing performance, employers' appraisals of nursing performance, and perceptions of nurse graduates of the adequacy of their preparation for nursing practice. Supporting data are provided.

HRP-0028140/2 Not Available NTIS
Virginia Polytechnic Inst. and State Univ., Blacksburg.
Causal Model of Nursing Education and State Board Examination Scores.
Lee M. Wolfle, and Lillian Ward Bryant. 1978, 5p
Pub. in Nursing Research v27 n5 p311-315 Sep-Oct 78.

A causal model was developed to provide a context for understanding the social process of nursing education. Ability factors and general academic performance levels were believed to be direct causes of performance on National League for Nursing (NLN) achievement tests, and State board examination (SBE) performance was assumed to be the result of the ability factor, general academic performance levels, and performance on NLN achievement tests. Each dependent variable in the model was assumed to be completely determined by observed variables specified in the model and by a variable referred to as 'disturbance' (all other sources of variation in the dependent variable). Data on NLN, SBE and other test scores were obtained for 121, 1970-76 graduates from an associate degree nursing program in southwestern Virginia. Scores on verbal and quantitative components of the School and College Ability Test and the Sequential Tests of Educational Progress in the fields of mathematics, science, social studies, reading, listening, and writing were recorded, as well as cumulative grade point averages. It was found that medical, surgical, and obstetric portions of SBE's depended primarily on mastery of subject matter. Performance on pediatric and psychiatric portions was related primarily to abilities acquired prior to nursing training. Statistical analysis results show that NLN achievement tests can help predict SBE performance. Supporting data are tabulated.

HRP-0028152/7 Not Available NTIS
Columbia Univ., New York. School of Nursing.
Teaching Ethics to Nurse-Midwives.
Joyce E. Beebe, and Henry O. Thompson. 1978, 5p
Pub. in Jnl. of Nurse-Midwifery v23 p31-35 Spring-Summer 1978.

Successful teaching and learning experiences dealing with ethics in nurse midwifery practice are examined. Ethical issues to be considered by nurse midwives include whether a woman should become pregnant or have an abortion if she is ill, the use of abortion as a form of birth control, the rights of unborn children, and the rights of pregnant women. Content areas proposed for a course in ethics include genetic counseling, contraception, the functions and purpose of sex, abortion, and the quality of life. Behavioral objectives to be incorporated in course modules are classified as course objectives (learners identify the historical basis for ethical principles), class objectives (learners demonstrate an understanding of how personal values and beliefs affect decisions on the management of patient care by role playing, making decisions about a course of action to be taken, identifying reasons for the decisions made, and participating in discussions of personal values and beliefs involved), and clinical objectives (learners identify ethical principles in such clinical situations as abortion counseling). The goal of teaching strategies is to offer learners an opportunity to explore their own values and beliefs in a calm and supportive atmosphere. Teaching strategies that have proven to be effective include a combination of lecture, discussion, small group role playing, case presentation, and ongoing evaluation in clinical practice techniques.

HRP-0028161/8 Not Available NTIS
Project Report -- Follow-up of Trained Nurse-Midwives.
Ruth Weinstein. 1978, 4p
Pub. in Jnl. of Nurse-Midwifery v23 p36-39 Spring-Summer 1978.

A survey was conducted to determine whether a group of nurse midwives trained under the auspices of the Western Hemisphere Regional Office's Medical Department in New York City, utilized knowledge and skills mastered in training and whether they conducted local training efforts. Four Caribbean islands were visited in 1977 to obtain information from 10 nurse midwives; replies were also received from 13 of 27 nurse midwives on various Caribbean islands. The final survey population included the 10 nurse midwives who were visited and 7 who responded to the questionnaire. Nearly half of all respondents indicated their role had changed after the training program. They had assumed such responsibilities as running prenatal and postnatal clinics, clinic organization and administration, training and supervision of other nurses and auxiliaries, individual and group counseling, and outreach. Even though over half stated that their role had not changed since training, they did report greater self-confidence and more trust and satisfaction on the part of patients. All but two felt they had been able to use most skills and techniques mastered during training. Specific skills included: conducting physical examinations, laboratory procedures, counseling and teaching contraceptive methods. Most stated their training had not involved them in operational decisions in family planning agencies, but all indicated improved ability to make decisions. Approximately 75 percent trained other personnel. The findings are discussed in terms of status and professional image.

HRP-0028252/5 Not Available NTIS
Indiana Univ. at Bloomington. Inst. for Child Study.
Improving Teenage Attitudes Toward Children, Child Handicaps, and Hospital Settings -- A Child Development Curriculum for Potential Parents.
Nicholas J. Anastasiow, Michael Everett, Thomas E. O'Shaughnessy, Patricia J. Eggleston, and Susan J. Eklund. Oct 78, 10p
Pub. in American Jnl. of Orthopsychiatry v48 n4 p663-672 Oct 78.

The FEED (Facilitative Environments Encouraging Development) program for seventh and eighth graders, which focuses on child-rearing practices, attempts to foster both knowledge of and positive attitudes toward children. A particular concern of the project is overcoming the effects of perinatal stress on low birth weight premature infants born to adolescent mothers. The students, who are potential parents, are taught the crucial significance of verbal interaction, emotional support, and encouragement of infant and child development in overcoming perinatal stress. In addition to classroom instruction, the students spend a portion of a day, 1 day a week on a rotational basis, in a preschool class for normal children, a preschool handicapped program, and a hospital. Evaluation of the program reveals significantly enhanced attitudes toward handicapped children, young children, and hospitals. FEED students support the notion of integrating handicapped individuals into the mainstream of society. The FEED program has been found successful in positively modifying students' feelings about allowing and encouraging a child's independence and self-expression and about nonphysical, nonpunitive discipline measures.

HRP-0028281/4 Not Available NTIS
Medical Coll. of Wisconsin, Milwaukee. Dept. of Gynecology and Obstetrics.
Mothers Are Still Mortal.
F. J. Hofmeister. 1978, 4p
Pub. in Southern Medical Jnl. v71 n10 p1193-1196 Oct 78.

Wisconsin's Maternal Mortality Study Committee is providing useful information to aid in combatting the factors which contribute to maternal mortality. Founded in 1953, the committee is composed of obstetricians, family practitioners, academicians, an anesthesiologist, a pathologist, and other special consultants. In Wisconsin, the death of a woman within 90 days of giving birth to either a live or dead infant is catalogued for evaluation. After receiving careful evaluation, each case is recorded either as a nonmaternal death or a maternal death; in the latter case, it is further designated as possibly preventable or not preventable. Preventability involves (1) the cooperation, interest, and intelligence of the patient; (2) the availability and quality of facilities and equipment; and (3) the availability of high quality professional assistance, including both nurses and physicians. All information relating to the case, including the committee's final opinion, is then made available to the attending physician upon his or her request. One of the prime goals of the committee is updating and standardizing terminology and statistical information regarding maternal deaths. In the period 1972-75, 70 percent of the maternal deaths were judged not preventable. However, in 12.1 percent of the instances, the course probably could have been altered if improved obstetric or general medical care had been given.

HRP-0028284/8 Not Available NTIS
New York Medical Coll., NY.
Methodologic Problem in Mortality Studies of Migrant Populations.
Mary Monk, and M. Ellen Warshauer. 1978, 6p
Grant PHS-RR-05398
Pub. in Jnl. of Chronic Diseases v31 n5 p347-352 1978.

The possibility of error in census estimates of migrant populations should be seriously considered when mortality studies reveal migrant death rates which are either a great deal higher or consistently higher than rates for nonmigrants. This conclusion was based on a cohort-analysis of black men born in New York State and in three Southern States. Between 1960 and 1970 there were unexpectedly sizable increases in the number of nonwhites listed as having been born in New York State. A second unexpected finding was that figures for the number of nonwhites in Georgia and the Carolinas decreased at unusually high rates. These changes could be attributed to errors in reporting births in the census. Such inaccuracies and changes in census population estimates would account for erroneous death rates for both migrant and nonmigrant populations. It is noted that in New York City, death rates for black migrants were higher than was actually the case, and those for nonmigrants lower. Three statistical tables are included.

HRP-0028353/1 Not Available NTIS
More Trouble for P.S.R.O.s -- And Perhaps for You.
Richard L. Peck. 1978, 6p
Pub. in Medical Economics v55 n10 p25ff 30 Oct 78.

Regulations have been enacted specifying that, once a PSRO is terminated, DHEW can select an alternative review body without public hearings. Physicians in an underserviced PSRO area will be given a chance to set up a new organization or take over the old one if they can prove that the local medical society obstructed PSRO development. Insurance carriers or State agencies can conceivably become reviewers instead of PSRO's; this approach is not favored by the Federal Government. State Medicaid agencies have more influence than ever on PSRO review but Federal officials maintain that these agencies are not as capable of performing the review function as physi-

cians. Focused review is inevitable from the cost perspective. Once a review organization determines it has controlled utilization via concurrent review, it will be expected to identify focused review targets and demonstrate that it can meet needs with accuracy. The PSRO effect is sometimes difficult to distinguish from other influences on utilization. The role of physicians in PSRO's and possible changes forthcoming in the PSRO system are considered.

HRP-0028356/4 Not Available NTIS
Hospital of the Univ. of Pennsylvania, Philadelphia.
Critique of the Bureau of Health Manpower. Estimates of the Need for Anesthesia Manpower.
Fredrick K. Orkin. 1978, 11p
Pub. in Medical Care v16 n10 p878-888 Oct 78.

The geographic distribution of and the need for anesthesiologists and the regionalization of anesthesiology services are addressed. A survey of members in the American Society of Anesthesiologists indicates that non-operating-room activities consume 21 percent of the time of anesthesiologists. This figure most likely underestimates the demand for time in respiratory therapy, intensive care, and pain control because there are too few anesthesiologists in many areas. The specialty of anesthesiology has been defined too narrowly, and this has an adverse impact on supply projections for the specialty. The ultimate effect of the Health Professions Educational Assistance Act of 1976 on the manpower pool will depend on the extent of exclusion of foreign medical graduates from the field of anesthesiology and the increased number of graduates from U.S. medical schools. Difficulties encountered in assessing requirements for anesthesiologists according to geographic area are examined, with particular attention given to the trend toward regionalization, per capita income as a factor in the location of medical specialists, the location of residency training, and hospital cost per day in an area. Predictions of the need for anesthesia manpower are hindered by a lack of knowledge about productivity and surgical utilization at the local level and by uncertain effects of forthcoming changes in health care delivery.

HRP-0028357/2 Not Available NTIS
Iowa Univ. Hospitals and Clinics, Iowa City.
Cost of Maternity Care in Rural Hospitals.
Herman A. Hein, and Norma N. Ferguson. 1978, 2p
Pub. in the Jnl. of the American Medical Association v240 n19 p2051-2052 3 Nov 78.

The development of regional systems of perinatal care and education is supported as a means of containing the cost of obstetrical services provided by rural hospitals. A questionnaire was sent to the administrators of hospitals in Iowa with maternity services. Of 128 questionnaires, 103 were returned. The focus of the questionnaire analysis was on room charges for mothers and infants and on delivery room fees. Obstetrical services were less expensive in small hospitals. There was no evidence to indicate that low occupancy figures were related to increased patient costs. Although Federal guidelines suggest that obstetrical services be consolidated as a cost-containment measure, the approach is questionable in terms of its validity in rural areas. To comply with the 500 per year delivery minimum in the guidelines would not necessarily be cost-effective for rural hospitals. Time and distance factors imposed by the consolidation of services would significantly change the accessibility of maternity services for pregnant women in rural locations. It is recommended that the future of small community hospitals be determined on the basis of available data and not on speculation or findings derived from the analysis of data for hospitals in metropolitan areas. Regional systems of perinatal care and education are a better alternative for adoption by Federal health planners than large-scale consolidation. The questionnaire is included.

HRP-0028358/0 Not Available NTIS
Institute of Medicine, Washington, DC.
Basic Health Information System for Outpatient Services.
Betsy Stephens. 1978, 15p
Pub. in the Jnl. of Ambulatory Care Management v1 n4 p83-97 Nov 78.

An information system involving patient-retained records in Botswana is detailed. The 12-month project leading up to the development of the information system was designed to minimize recordkeeping procedures and maximize usable data generation. Three major constraints affected system design: (1) almost all primary care is delivered by registered nurses who are supported by paramedical workers and supervisory regional health teams; (2) services are predominantly rural in areas with no telecommunications and inadequate road transport; and (3) the population itself is very mobile. To test the feasibility of patient-retained records, an information system package was devised and introduced at five clinics for 6 months. Evaluation of system components with regard to their efficiency and effectiveness involved both subjective and objective techniques. It was determined that patient-retained or home-based records in outpatient clinics are advantageous for community health surveys and services. Clinic-based records, however, are necessary for reporting statistical data and for identifying defaulting clients in order to provide appropriate followup care. The loop effect of the information system designed in the Botswana project is dependent on provider compliance with recordkeeping requirements and on information utilization. Examples of patient-retained and clinic-based recordkeeping forms are provided.

HRP-0028361/4 Not Available NTIS
Putting Health Care Costs Under a Microscope.
John Jennrich. 1978, 6p
Pub. in Nation's Business v66 n11 p77ff Nov 78.

Ways in which health care costs can be minimized are discussed, with attention given to consumer involvement and planning. The problem of rising health care costs is related to the lack of incentives to reduce costs and the overuse of expensive medical procedures. Four links in the health care delivery system, none with any incentives to save, are individual consumers (patients), physicians, hospitals, and insurance companies. If a mechanism for dealing with health care problems in general is established, problem resolution will cover three broad areas: (1) cost containment measures to achieve short-term results; (2) long-range planning and involvement in the health community; and (3) alternatives to the traditional fee-for-service system. Self-insurance techniques, although primarily for larger companies, are cost-effective. Three possibilities for the application of this approach are prospective hospital reimbursement, prenegotiated physicians' fees, and volume purchasing of drugs and optical equipment. Consumers are critical in the consideration of costs and in making medical decisions, and an insurance plan designed to keep individual interest in some portion of all costs may help to reduce costs. Planning for cost containment is a process that involves the business world, the private sector, insurers, and government. Examples of efforts to curtail health care costs are cited.

HRP-0028363/0 Not Available NTIS
Tufts Univ., Boston, MA. School of Medicine.
Should Diagnostic Testing Be Regulated.
Jerome P. Kassirer, and Stephen G. Pauker. 1978, 3p
Pub. in the New England Jnl. of Medicine v299 n17 p947-949 26 Oct 78.

Advantages and disadvantages associated with the regulation of diagnostic testing are analyzed. Although diagnostic tests are expensive, the trend is to use them frequently and inappropriately. Certificate-of-need legislation regulates certain diagnostic tests, such as cardiac catheterization and computerized tomography. It can be argued that diagnostic tests should not be externally regulated and that, in this domain, physicians should be autonomous. On the other hand, economic incentives that reward physicians who contain the costs of testing and penalize those who do not may be feasible. Governmental restraints might serve to encourage the more efficient allocation of resources (localizing particular tests to a limited number of centers or restricting hospitals and physicians to fixed annual budgets for diagnostic testing). Overall, an extensive program to regulate diagnostic testing is not beneficial. Regulation through an incentive system might be rational, although its value is uncertain. The fee-for-service method provides an incentive to conduct too much testing, but prepaid plans do not necessarily curb excessive testing. Principles relevant to the proper use of diagnostic testing are summarized. The need for the medical community to be aware of these principles through education is emphasized. Benefits accruing to individual patients through diagnostic testing are examined.

HRP-0028420/8 Not Available NTIS
ARA Food Services Co., Philadelphia, PA.
Sound Financial Management Calls for Increased Staff Involvement.
James Reynolds. 1977, 3p
Pub. in Hospitals, Jnl. of the American Hospital Association v51 n22 p66-68 16 Nov 77.

The need for good financial management in all areas of a hospital is discussed, and the zero-based budgeting process is considered as one way of helping food service managers involve staff in the department's financial affairs. Financial management is defined as the development of a comprehensive plan based on an estimate of particular details that will support the hospital administration's aims and objectives. For the food service department to practice sound financial management, firm objectives must be established. A realistic budget must then be developed to meet these objectives. The entire staff must be made to understand the financial restrictions that the budget imposes on the department. The zero-based budgeting process is a planning technique that involves all levels of an organization in establishing individual goals and budget requirements. In the zero-based budgeting process, work units are established, costs are determined, and productivity efforts are decided. Each work unit is reviewed in terms of incremental levels of spending. Management then assesses all services and projects and ranks them in order of importance. Zero-based budgeting is said to be an ideal tool for sound financial management.

HRP-0028422/4 Not Available NTIS
Maryland Univ. at Baltimore. School of Nursing.
School Health Teaching Elective.
Ada Davis, Nancy Krauss, and Susan Woolsey. 1977, 3p
Pub. in Nursing Outlook v25 n10 p637-639 Oct 77.

Clinical experience in teaching health to school-age children was provided for senior students at the University of Maryland School of Nursing. The course resulted from the decision of 15 students to function as health teachers in various school settings. It was selected by students for a 1-month clinical experience between semesters. Students organized small groups with varied interests in terms of teaching different grade levels. Test questions suitable to various ages were formulated. Schedules were arranged so that students could be in schools 2 days per week. An additional day was reserved for seminars with faculty members. Weekly 1-day field trips to a community of young adult retardates, to a children's center for emotionally disturbed youngsters, and to a school for the deaf were arranged. One faculty member was present at all times in classrooms where nursing students taught. Topics covered in classroom sessions were the gynecological examination, nutrition, dental care, and physician office visits. Feedback from schools regarding nursing student health education was extremely positive. The importance of the nurse as educator in schools and in the community is stressed.

HRP-0028427/3 Not Available NTIS
Queen's Univ., Kingston (Ontario). Dept. of Community Health and Epidemiology.
Quality of Care in Hospital Emergency Departments and Family Physicians' Offices.
R. A. Spasoff, P. Lane, and R. Steele. 1977, 4p
Pub. in Canadian Medical Association Jnl. v117 n3 p229-232 6 Aug 77.

A comparison is provided of the care given to individuals with nontraumatic conditions in the emergency departments of general hospitals and in the offices of family physicians. A total of 686 episodes of care provided in the offices of 5 family physicians and in 2 emergency departments were evaluated. Seven indicator conditions were chosen for study, including: urinary tract infections in women 16 years old and older; back pain in men

and women between the ages of 21 and 65; headaches in persons 21 years of age and older; vaginal discharges in women ranging in age from 16 to 40; otitis media; chest pain in men 30 years of age and older; and depression in persons 22 years of age and older. It is noted that care was considered adequate in 40 percent of the cases dealt with in family physicians' offices and in 53 percent of the cases dealt with in hospital emergency departments. Referrals are said to have been quite common in all settings. It is noted that, overall, the quality of care delivered in emergency departments was better than that delivered in family physicians' offices. People are said to often find it bothersome to contact their own physicians and prefer the convenience of the emergency room. Data are given in tabular form.

HRP-0028470/3 Not Available NTIS
West Virginia Univ., Morgantown. Dept. of Health Education.
Is Community Research Effective in Establishing Health Education Programs.
Bill Carlton. 1977, 3p
Pub. in Health Education v8 n2 p10-12 Mar-Apr 77.

The effectiveness of a family health study in two Kentucky counties in establishing health education as a component of the health delivery system is explored. Three hundred families in Bell and Harlan Counties were surveyed to ascertain the health needs of the people, their attitudes toward health and medicine, and their knowledge of certain diseases and symptoms. Only 12 percent of the sample had seen a dentist within the past 12 months. Emotional problems also seemed widespread. Although 59 percent of the sample said that they were depressed a great deal of the time, only 36 percent said that a physician should be seen for depression. Organic illnesses were common. Chronic lung disease, emphysema, diabetes, heart disease, high blood pressure, and arthritis were frequently mentioned. Knowledge was limited concerning the symptoms of cancer, diabetes, and heart disease; information had been obtained from relatives, friends, and television. Many persons surveyed were dissatisfied with the health care available -- citing costs, long waits in the physician's office, and impersonal and often rude attention. As a result of the findings, education programs for ambulatory and institutionalized patients were begun and employees were given classes in human relations. It is concluded that carefully planned studies of health attitudes, knowledge, perceived needs, and resources can be employed in establishing the need for scientifically sound health education.

HRP-0028496/8 Not Available NTIS
Values Clarification in Nursing -- Application to Practice.
Diane B. Uustal. 1978, 6p
Pub. in American Jnl. of Nursing v78 n12 p2058-2063 Dec 78.

Ten value clarification strategies are presented to increase awareness and appreciation of self and to explore selected value conflicts and ethical dilemmas in the field of nursing. Traditional professional values are being questioned, professional roles are being redefined, and the scope of nursing is being expanded. How nurses perform depends on their philosophy, which is formed from their values. Values are concepts and, as such, are embodied in specific value judgments or claims that a person makes. They must be freely chosen and must be selected from alternatives. Values exist only after the consequences of choices have been carefully considered. The clarification of values can have a significant effect on patient teaching. The 10 value clarification strategies constitute exercises intended to bring about changes in nursing, in the sense of building positive self-image and gaining greater insight into personal value systems. Directions accompany the 10 strategies or exercises dealing with name tags, patterns describing self, forced-choice rank ordering, a values continuum, values voting, the use of unfinished sentences to examine attitudes and values, a values grid (theory of value clarification in action), a planning board on the nurse-patient relationship, ethical dilemmas, and questions on feelings and clarification of values that emerge. A bibliography is included.

HRP-0028498/4 Not Available NTIS
Starting a Private Practice.
Nancy Gerberding McShane, and Elizabeth McDowell Smith. 1978, 3p
Pub. in American Jnl. of Nursing v78 n12 p2068-2070 Dec 78.

Counseling and guidance to men and women, including families and young couples, at a private practice in the Philadelphia, Pa., area operated by nurses is described. The initial idea of the practice was to deal primarily with women's problems. Service was subsequently expanded to include men, couples, and families seeking support in coping with daily life. Since nurses established the practice, they were able to be their own employers and to write their own job descriptions. A lawyer was consulted who researched the Pennsylvania Nurse Practice Act. The cost of incorporating the practice amounted to $450. After searching for a central location close to public transportation and with enough convenient parking, a frame house on a main street with an entire first floor available was found. Office furniture and related equipment were purchased. The next step was making the community aware of the office and services provided. Personal visiting and brochures sent to women's groups, university counseling centers, churches, schools, day care centers, pediatricians, and general practitioners were publicity techniques used. At the outset, a major source of referrals was a psychologist. The practice became self-supporting just 2 months after its formal opening. Referrals then came from many sources, including publicity, word of mouth, and the purchase of space in the Yellow Pages of the telephone directory. A library is available to clients at the office. Fees for visits range from $10 to $35.

HRP-0028518/9 Not Available NTIS
Effects of Bereavement on the Family and the Nursing Implications.
Grace Lemasters. 1978, 5p
Pub. in Jnl. of Gerontological Nursing v4 n6 p21-25 Nov-Dec 78.

The role of nurses in offering services and support to dying patients and their families is addressed. Elderly persons experience the loss of their spouses more often than any other age group, although little research dealing with older widows and their adaptation to bereavement, grief, and life changes as a result of widowhood has been conducted. Nurses must be aware that elderly persons are often not adequately prepared for the loss of their spouses. Persons with families and support systems in the community will most likely adapt to loss very quickly. Nursing care should be available to these persons to help them during initial feelings of loss. The high-risk population who may not experience healthy adaptation to loss requires a significant amount of nursing care. Nurses in hospitals have the opportunity to alleviate many potential stresses and emotional trauma. If a patient's illness has extended over a relatively long period of time, the health status of the surviving spouse should be assessed since that person's physical and emotional strength may have been depleted in caring for the ill person. Nurses in physicians' offices can evaluate the health status of patients by realizing that the elderly frequently present physical complaints during bereavement. Interventions by community health nurses in the home can serve to assess adaptation on an individual basis. If nurses are educationally prepared in the area of mental health dynamics, they have the needed skills to provide appropriate nursing interventions.

HRP-0028538/7 Not Available NTIS
Yale Univ., New Haven, CT. School of Medicine.
Computerized Tomography (CT) -- A Financial and Legislative Reappraisal.
Gerald S. Freedman. 1978, 6p
Pub. in Applied Radiology v7 n6 p140-144, 242 Nov-Dec 78.

The purpose of this discussion is to reassess legislative and financial forces which are stimulating demand for computerized tomography (CT) while containing its growth. Included are reviews of Federal health-planning history and of the CT market; an analysis of national and international market growth and company visibility; a financial analysis based on the annual operating costs; and information on customary charges and reimbursement. In the future, sophisticated (CT) scanning technology, while somewhat restricted by various pressures, will nevertheless continue to expand. The CT issue symbolizes both all that is good and all that is potentially bad in the U.S. health care system. Because CT scanning involves high costs, both direct and indirect, adequate utilization is necessary to ensure profits or even to break even. The combined effects of certificate-of-need restrictions, excess industry capacity, and limited reimbursement will probably bring the average costs of scanners down in the future. Lowered CT examination costs will then compete with the costs of other imaging techniques and will substitute for surgery in other situations.

HRP-0028663/3 Not Available NTIS
Manitoba Univ., Winnipeg.
Elective Surgical Rates -- Do High Rates Mean Lower Standards.
Noralou P. Roos, Leslie L. Roos, and Paul D. Henteleff. 1977, 6p
Pub. in the New England Jnl. of Medicine v297 n7 p360-365 18 Aug 77.

Alternative explanations for regional variations in tonsillectomy and adenoidectomy rates were tested in this study using claims data from the Province of Manitoba in Canada. The data were taken from the hospital, medical, and registration files of the Manitoba Health Services Commission. The study methodology involved comparison of respiratory morbidity, standards of selection for operations, and surgical resources with elective surgical rates across geographic areas. Individual practice patterns were also explored. No strong consistent relation was found between elective surgical rates and either standards of selection or respiratory mobidity. All regions were characterized by similar wide variation among physicians in their disposition to perform these procedures. The use of the procedures and the standards applied were found to be only weakly related to such variables as the physician's age, training, and specialty. It is concluded that the research challenges the assumption that high elective surgical rates indicate lowered standards of practice.

HRP-0028668/2 Not Available NTIS
Less Paperwork and More Communication Aids South Carolina's Early and Periodic Screening, Diagnosis and Treatment (EPSDT) Program.
John C. Miller. 1978, 4p
Pub. in Forum v2 n4 p25-28 1978.

Communication was the key to South Carolina's successful turnaround in attracting physicians and dentists to provide services for children under the Early and Periodic Screening, Diagnosis and Treatment program. The new communication effort began in 1973 and peaked recently in a workshop on billing for dentists sponsored by the State's Bureau of Medical Assistance. Dentists' paperwork was facilitated by incorporating billing forms into the standard American Dental Association form. At the workshop, dentists were reassured that claims review was intended to assure that claims conformed with the standards for treatment established by the Bureau. The administrator referred submissions which did not conform to a staff consulting dentist for determination. To speed reimbursement for dental and medical services, the Bureau developed a computer-based system which includes checks for errors and abuses by providers. The program hopes to elicit the same cooperation from physicians that it has received from the dentists. Physicians' problems have already been studied by the South Carolina Medical Association. The next steps in recruiting physicians will involve mailings explaining the program as it is envisioned and asking for suggestions, as well as a workshop similar to that which was held for dentists.

HRP-0028749/0 Not Available NTIS
Georgetown Univ., Washington, DC. Joseph and Rose Kennedy Inst. for Study of Human Reproduction and Bioethics.
Quality of Life, The Sanctity of Life.
Richard A. McCormick. 1978, 7p
Pub. in Hastings Center Report v8 n1 p30-36 Feb 78.

This article focuses on the preservation of life in light of advanced technologies in the medical field

designed to sustain life. The case of Karen Ann Quinlan is cited to illustrate moral and ethical issues inherent in the area of life preservation. With the advent of new technologies, life can be sustained almost indefinitely; this fact raises value questions. Situations involving the preservation of life are particularly difficult in neonatal intensive care units. Increasingly, decisions about life support are becoming narrowly focused on a single element, the kind of life the patient experiences as a result of the employment of life support technologies. The following pertinent issues are addressed in relation to the quality of life: life as a condition for other values and achievements, the sanctity of life versus the quality of life, quality-of-life criteria, and the means approach and the sanctity of life. The need for quality-of-life judgments that express and reinforce concern for the sanctity of life is stressed. Literature on the preservation of life is reviewed.

HRP-0028761/5 Not Available NTIS
Duke Univ., Durham, NC. Inst. of Policy Sciences and Public Affairs.
Health Resource Allocation and Quality of Care Measurement in a Social Policy Framework.
Joseph Lipscomb. 1978, 25p
Pub. in Policy Sciences v9 p19-43 1978.

An activity analysis production function that links the structure, process, and outcome of medical care in a social policy framework is introduced. The resource allocation model has an explicit stochastic structure, semi-Markovian rather than pure Markovian in thrust. This departure from traditional models is based on recognition that a pattern of disease prevalence typically involves transitions among states and stays of variable duration in each state. The model focuses on the interaction among process, structure, and outcome and can be regarded as a possible vehicle for defining quality of care related to a set of intervention strategies. Indexes are proposed that represent extensions of a quality assessment introduced by Bush et al. in the context of emergency medical services. As a general policy analysis model, the activity analysis production function is designed to determine the allocation of inputs among programs that maximizes expected improvements in the health status of a population. Reflected in the production function are the expected efficacy of various treatment modalities and population preferences among program outcomes. It is concluded that a social policy model is a potentially useful paradigm in the evaluation of public programs. Illustrations of the model and supporting equations are included.

HRP-0028765/6 Not Available NTIS
Wisconsin Univ.-Madison. Dept. of Sociology.
Illness Behavior, Social Adaptation, and the Management of Illness -- A Comparison of Educational and Medical Models.
David Mechanic. 1977, 9p
Pub. in the Jnl. of Nervous and Mental Disease v165 n2 p79-87 1977.

The influence of the patient's search for meaning, social attributions, and social comparisons on adaptation to illness and subsequent disability is explored. A holistic view toward health and illness is adopted to understand how illness behavior may provide strategies for nontraditional care and rehabilitation. Relevant to the study of illness behavior are general principles associated with adaptation to stress or crisis. There are various ways in which adaptive needs interact with responses to symptoms and illness. Variations in response to illness are independent of the impact of stressful life events and distress on the occurrence and course of illness itself. Illness behavior is dynamic, i.e., it changes in relation to personal and social conditions. Patients try to determine what causes contribute to their situation in the process of understanding illness experiences or injuries. The stage of illness and its characteristics are relevant in evaluating the extent to which it is useful or damaging for patients to see themselves as instrumental in controlling their conditions. Disability is both a social definition and a physical status. Monitoring over time is necessary in the process of shaping concepts of the nature of illness and disability. The use of a coping-adaptation model to improve patients' functioning and the relationship between the social adaptation model and traditional medical approaches are examined.

HRP-0028839/9 Not Available NTIS
Regional Variations of Health Care Delivery and Utilization in the United States.
1978, 24p
Pub. in Health Manpower Literature v2 n1 p9-32 1978.

Variations in the delivery of health care across the United States were examined, with particular emphasis on two areas similar in per capita income (Pacific and New England regions) and hospital utilization in two urban centers (San Francisco, Calif., and Boston, Mass.). Three hypotheses were tested: (1) regional demand for health care is influenced by cost, health service availability, and socioeconomic variables for each region; (2) each region's deviation from the mean U.S. health care utilization is not significant; and (3) the regional mix and size of hospitals are reflected in utilization patterns. A mathematical model was employed to test the hypotheses and associated variables. The analysis showed that the regional demand for health care was influenced primarily by available health services (beds, physicians, and allied health personnel) and secondarily by cost of services and socioeconomic differences. The specific size and type of hospitals varied by region. Regional access to and choice of health care (short-term or long-term hospitalization, ambulatory care, and home care) were influenced by the regional structure of the health care industry. The level of technology and of allied health employment in all hospitals was affected by a hospital's desire for prestige and by the desire of affiliated physicians for more patients and higher income. No definitive relationship could be established among health care personnel utilization, productivity, and wage levels. Supporting data are tabulated.

HRP-0028840/7 Not Available NTIS
Manpower Implications of National Health Insurance.
1977, 27p
Pub. in Health Manpower Literature v1 n2 p7-33 1977.

The impact of a national health insurance (NHI) program on health professionals in the United States is considered. Three ways of reducing inflationary pressures on health care costs are identified: (1) through public utility regulations, the quantity, quality, and price of services can be regulated to allow an adequate return to producers and to provide some protection for consumers; (2) the Federal Government can provide substantial incentives to alternative delivery facilities so that organizations such as health maintenance organizations and neighborhood health centers can compete with existing institutions; and (3) the introduction of coinsurance can induce consumers to seek less costly forms of health care. It is necessary to examine past Federal intervention in the health care industry in order to evaluate the prospects for health manpower under an NHI program. Changes that may result from the implementation of NHI with regard to health manpower involve the structure and deployment of allied health personnel and the deployment of bureaucratic personnel in administrative positions. It is envisioned that any NHI plan will most likely increase the demand for health care services, and therefore, the demand for health manpower. The assumption cannot be made that the occupational mix for any specific type of health services will remain unchanged. Data on the structure of NHI plans introduced as of February 1976 and on health manpower requirements are tabulated.

HRP-0028841/5 Not Available NTIS
Computer-Assisted Medicine -- The Missing Link.
H. Dominic Covvey, and Neil Harding McAlister. 1978, 8p
Pub. in Canadian Medical Association Jnl. v119 n8 p968ff 21 Oct 78.

Methods for the use of computerized systems in the medical field are described. Computer system hardware includes central processing units, storage devices, and input/output equipment. Disks, magnetic tape drives, and most line printers are connected to computers via parallel interfaces. Interfacing in parallel means that data words have their component bits moved simultaneously between computers and devices along 16 or more parallel wires, one wire for each bit and others for control signals. In the case where remote terminals must have access to computers or where two or more geographically separate computer systems must communicate, data are transmitted in a serial mode one bit at a time. Characters are transmitted with an arbitrary time between each of them in asynchronous communication. One of the advantages of this type of communication is that computers have to perform relatively little processing. Synchronous communication technology is utilized to achieve higher data transmission rates and automatic error detection. Various forms of technology are available for serial digital communications. Experimental systems are being developed to facilitate long distance data transmission for hospitals. An organized network can be used to link multiple computer systems. Other communication structures are point of sale data collection systems and remote job entry techniques. The decision to use computers in the medical field must be made in light of advantages and limitations of technology. A bibliography is included.

HRP-0028854/8 Not Available NTIS
Florence Univ. (Italy). Ist. di Radiologia.
Mass Screening for Early Breast Cancer Detection.
Mario Cappellini, Stefano Ciatto, and Giancarlo Maltoni. 1978, 7p
Pub. in Tumori v64 n5 p479-485 1978.

A screening program for early breast cancer detection was initiated by the Center for Social Dieases in Florence, Italy, in 1969, and a total of 21,725 women were examined from January 1969 to March 1977. The diagnostic procedure of choice in examinations was mammography, followed by physical examination if necessary. The screening program involved two parallel experiences. In the first experience, only self-presenting women were examined. In the second experience, screening was conducted after inviting the entire female population in the Florence metropolitan area who were over 40 years of age. Of 21,725 women who were examined out of 35,138 women invited, 67 cases were detected at first mammography. The 5-year survival rate for these cases was 94 percent. In 101 cases, diagnosis of cancer or suspect cancer was made. Hystological diagnoses in 28 cases of hystologically nonmalignant lesions were 11 cases of fibrocystic disease, 5 fibroadenoma, 1 dermatofibroma, and 11 preneoplastic dysplasia. As of March 1977, 6,908 cases had been controlled with at least one biennially repeated mammography. Changes in tumor size were not significant in the interval from first mammography to diagnosis. The value of the screening program was confirmed by reported results in terms of secondary prevention (early diagnosis). Supporting data are provided.

HRP-0028855/5 Not Available NTIS
Mental Health Counseling Dimensions of Special Education Programs.
Philip L. Safford. 1978, 5p
Pub. in the Jnl. of School Health v48 n9 p541-543, 546-547 Nov 78.

Developments in services for the handicapped and further needs are examined in relation to mental health counseling in educational programs. Events breaking the pattern of segregation and physical and psychological isolation of handicapped individuals are deinstitutionalization, the enactment of the Education for All Handicapped Act of 1975 (P.L. 94-142), and approval of an addition in 1977 to the 1973 Rehabilitation Act that prohibits discrimination against the handicapped. Provisions of Federal and State laws relevant to the mental health of handicapped children include the following: free and individualized education for all handicapped children from birth through 21 years of age; the least restrictive placement environment; and requirements for due process, procedural safeguards, multifactored assessment, and nondiscriminatory testing. Developments are viewed within the context of the civil rights movement. Potential problem areas in mental health counseling, conducted in the school environment, pertain to stereotyping, the inability of students to meet academic and physical demands of school participation, the need for providers of special education services to have skills in counseling, the fact that specialized education is rarely described or de-

fined in mental health dimensions, delays in efforts of public schools and State agencies to meet deadlines for accomplishment of priorities, limited funding, and inadequate criteria for specifying students who qualify as handicapped.

HRP-0028901/7 Not Available NTIS
New York State Office of Mental Hygiene, Albany.
Dilemma -- Blocking Community Residences for the Chronically Mentally Disabled.
Alvin M. Mesnikoff. 1978, 7p
Pub. in Psychiatric Quarterly v50 n4 p288-294 1978.

The need for community facilities to house chronically mentally disabled patients presented a conflict in New York City between their unrestricted construction and the prevention of community overburdening. The South Beach Psychiatric Center therefore decided to collaborate with others in opposing unrestricted development. When the center was planned, the widespresd use of such homes had not been considered. The resulting strain that they would place on existing psychiatric, medical, and community services was not incorporated in the planning. In response to community concern about a large home for adults in Brooklyn, a model of collaboration was developed between the center and the home. It was recognized that residents required many types of rehabilitation services and that return to competitive employment was usually not possible. The center recommended that: domiciliary care facilities be limited to 25 residents; the proportion of mentally disabled persons in large facilities be limited to 30 percent; new domiciliary care facilities for Staten Island and West Brooklyn be carefully planned; domiciliary care facilities provide room, board, and laundry separate from mental health and rehabilitation services; facilities be subject to regular inspections; communities where domiciliary care facilities are to be located be given an opportunity to respond through local community planning boards; and domiciliary care facilities be approved for areas where they are needed.

HRP-0029369/6 Not Available NTIS
Iowa Hospital Association, Des Moines.
State and Planning Subarea Patterns of Patient Destination and Hospital Utilization, September 3-30, 1977. Volume 1.
Sep 78, 132p
See also Volume 2, HRP-0029370. Prepared in cooperation with Iowa State Health Planning and Development Agency, Des Moines.
Available from the Iowa Hospital Association, Suite R, 600 Fifth Ave., Des Moines, Iowa 50309.

Extensive statistical data on patient destination for hospitals in planning areas served by the Iowa Health Systems Agency, the Illowa Health Systems Agency, and the Midlands Health Systems Agency and for other counties and States are presented. Data on the following variables were collected from September 3-30, 1977: patients' residences by county and zip code, length of stay, age, type of admission, external site of admission, discharge disposition, source of payment, and principal diagnosis. Participating hospitals included 134 in Iowa, 6 in Illinois, 4 in Nebraska, 2 in South Dakota, 4 in Wisconsin, 4 in Minnesota, and 2 in Missouri. Admission types are categorized in the tables as emergent or nonemergent. External site of admission is classified as routine, transfer from other acute care hospitals, or admitted from a skilled nursing facility, intermediate care facility, nursing home, or other health care facility. Discharge disposition categories encompass discharge to family residence (home), discharge against medical advice, transfer to another acute care hospital, skilled nursing facility, intermediate care facility, nursing home or other health care facility, and expired (death). Maps of subareas served by the health systems agencies are included.

HRP-0029370/4 Not Available NTIS
Iowa Hospital Association, Des Moines.
State and Planning Subarea Patterns of Patient Origin and Hospital Utilization, September 3-30, 1977. Volume 2.
Sep 78, 394p
See also Volume 1, HRP-0029369. Prepared in cooperation with Iowa State Health Planning and Development Agency, Des Moines.
Available from the Iowa Hospital Association, Suite R, 600 Fifth Ave., Des Moines, Iowa 50309.

Extensive statistical data, accompanied by maps of subareas served by the Iowa Health Systems Agency, the Illowa Health Systems Agency and the Midlands Health Systems Agency, deal with patterns of patient origin and hospital utilization for September 3-30, 1977. Data were compiled from information supplied by hospitals in Iowa and contiguous areas of other States. Of 158 hospitals contacted, 156 or 98.7 percent responded. Data for each participating hospital are provided, showing the number of patients hospitalized from each county and their zip codes, average length of stay, age, sex, admission type, external site of admission, and discharge disposition. Sources of information are member hospitals of the Health Service Data System (HSDS) and nonmember hospitals that were asked to complete a form on patient information by health service area. Source of payment and principal diagnosis information for each patient are also included. External sites of admission are defined as routine, or transfer from another acute care hospital, skilled nursing facility, intermediate care facility, nursing home, or other health care facility. Admission types include emergent and nonemergent. Discharge disposition is categorized as discharge to family residence (home), discharge against medical advice, transfer to another acute care hospital, skilled nursing facility, intermediate care facility, nursing home or other health care facility, and expired (death).

HRP-0029462/9 Not Available NTIS
InterStudy, Excelsior, MN.
How Business Can Stimulate a Competitive Health Care System.
Gerald B. Meier, and Mary M. Hunter. 1978, 46p
See also HRP-0029459 -- HRP-0029461; HRP-0029463 -- HRP-0029464. National Health Care Strategy Series.
Available from Chamber of Commerce of the U.S., 1615 H. Street, N.W., Washington, DC 20062.

Alternative health care delivery systems (ADS's) can create competition within the health care industry. This report defines the ADS concept and describes ways that ADS's can be organized. It also provides examples of ADS's that have been supported or sponsored by businesses, shows how individual ADS's control the costs of providing care and how the existence of ADS's in a community stimulates the competition that fosters cost-containment, and outlines an action plan that shows businesses how they can offer, support, and sponsor ADS's. Businesses can foster ADS's by offering employees a variety of health plans in their employee fringe benefits package, rather than health insurance alone. The most common and most popular type of ADS is the health maintenance organization (HMO). HMO's are able to offer lower premiums by reducing hospital admissions and by reducing the length of hospital stays. Other types of ADS's that businesses might consider are the expanded industrial clinic (where physicians are hired by the company), the insurer-physician health plan (where primary care physicians coordinate services), and the health care alliance (where the insurance premium is based on provider efficiency). Examples of companies that have set up such plans are provided. Three appendixes are included: a list of HMO's operating as of August 1978, a summary of HMO's and Government regulations, and a list of selected references.

HRP-0029563/4 Not Available NTIS
National League for Nursing, Inc., New York. Div. of Research.
Research Programs of the National League for Nursing.
Walter L. Johnson. 1977, 5p
Pub. in Nursing Research v26 n3 p172-176 May-Jun 77.

The components of the National League for Nursing's research program are examined. The basic goal of the league's research is to collect useful data for the benefit of nursing and explore issues relevant to policy formulation. A research and studies department was created in 1959. This helped to centralize the administration of certain projects and to bring additional technical skills and capabilities to bear on the conduct of research studies. Most investigative activities of the league tend to focus on nursing education, nursing students, and organizational aspects of community health nursing. Research has an applied orientation, with problem selection closely related to timely issues. The research program is administered through periodic surveys and the development of special projects to provide answers to specific research questions. Periodic surveys concern directories of nursing schools, statistical compilations, and yearly reviews of community health services. Special projects deal with such areas as nurses' career patterns, open curriculums and the student selection process. The various research activities of the league are generally aimed at concerns of nursing, such as manpower dynamics, improving the chances for career mobility, improving mechanisms of student selection, describing changes in nursing programs and their faculties, and accumulating systematic information that may be useful in improving the licensure mechanism.

HRP-0029581/6 Not Available NTIS
Georgia Dept. of Human Resources, Atlanta. Child Health Unit.
Food Becomes Fun for Children.
Betty B. Wills. 1978, 4p
Pub. in American Jnl. of Nursing v78 n12 p2082-2085 Dec 78.

The relationship between child development and nutrition is considered and the use of the Denver Developmental Screening Test (DDST) for the nutritional assessment of children is detailed. Changing poor dietary practices constitutes a major factor in preventing health problems among children. Because emotional barriers are often raised by questions directed to mothers concerning their child-feeding practices, the reliability of information can be compromised. A strategy was devised for Georgia nurses based on two assumptions: (1) that mothers will give more realistic information about eating habits when they discuss their children's developmental activities in general; and (2) that nurses' counseling will be more effective if focused on anticipatory guidance with regard to expected growth patterns of children. A developmental profile of children in Georgia was obtained using the DDST. The DDST is composed of four sections dealing with personal-social, fine motor-adaptive, language, and gross motor skills. It emphasizes the early detection of developmental problems and indicates points at which nutrition activities can be initiated. The advantages of the use of the DDST by nurses in nutrition assessment, (e.g., that it minimizes the defensiveness, strengthens the reliability of information, helps mothers listen for cues, facilitates learning through the interaction of all individuals, and enables mothers and children to have fun learning), are outlined. The DDST and suggestions for obtaining and sharing nutrition information are included.

HRP-0029582/4 Not Available NTIS
Boston City Hospital, MA.
Blizzard '78 -- Dealing With Disaster.
Anne Hargreaves, George I. Krell, Barbara Blakeney, and Mary Ryan. 1979, 4p
Pub. in American Jnl. of Nursing v79 n2 p268-271 Feb 79.

Critical problems faced by a 500-bed acute treatment facility in Boston, Mass., when a blizzard virtually immobilized the city for about 7 days, were the maintenance of institutional integrity and quality patient care and the health care needs of a homebound population. Associated challenges of the long-term emergency situation were: working within the constraints of limited personnel and resources, improvising, intensifying certain activities, and functioning outside traditional roles to some extent. Day shift nurses were held over, when possible, to the evening shift. Double shifting, 16 hours on and 8 hours off, enabled the nursing department to maintain clinical services when many staff members were unable to report for their regular shifts. Since nurses came in from a variety of areas of health care -- hospital clinics which were closed, public health, and school health care -- the hospital nursing department devised an on-the-spot refresher program that included clinical orientation to inpatient policies and hospital procedures. Social work services were provided, and nursing administrative personnel and faculty members from the school of nursing ventured beyond their traditional roles to participate with clinical teams on ward as-

signments. Homebound patients presented special problems to nurses and social workers. To meet the needs of the homebound, a telephone triage system was developed. Neighborhood health centers were employed to provide outpatient care. The experiences of hospital staff members during blizzard conditions highlighted the importance of a team effort and the use of volunteers.

HRP-0029583/2 Not Available NTIS
Catholic Univ. of America, Washington, DC.
Suicidal Adolescent.
Nancy A. Hart, and Gladys C. Keidel. 1979, 5p
Pub. in American Jnl. of Nursing v79 n1 p80-84 Jan 79.

The experience of nurses in working with depressed, suicidal adolescents and their families is discussed. Given existing social conditions, adolescence is a disrupting state of development even for well-adjusted persons. The central theme of adolescence is finding oneself, and this leads to intensified self-awareness. One study of families with suicidal adolescents notes the following characteristics: communications are not as productive as in families with no history of adolescent suicide attempts; communication indicates much conflict; problemsolving ability is impaired, probably related to the conflict; and inconsistent positive reinforcements with a greater number of negative reinforcements are used. Features characteristic of high-risk teenage groups, indicating those most susceptible to suicide, are discussed. Nurses have special skills that can be utilized to help troubled teenagers. They can be sensitive to the dynamics of why adolescents feel life is not worth living. School nurses are in a unique position to help adolescents. All nurses must recognize the importance of getting others involved. Conferences and seminars about suicide and adolescents are useful in disseminating information to health professionals and/or the community. Assessment skills related to interpersonal communication and suicide methods are needed by nurses to deal with potential adolescent suicides. Possible danger signs are listed and issues of liability and personal involvement on the part of nurses are explored.

HRP-0029585/7 Not Available NTIS
World Health Organization, Geneva (Switzerland).
Nursing's Case for Third Party Reimbursement.
Carole P. Jennings. 1979, 5p
Pub. in American Jnl. of Nursing v79 n1 p110-114 Jan 79.

The need for nurses to exert substantial economic force in health care reimbursement policies, particularly third-party reimbursement, is emphasized. Three issues are involved: they include fee-for-service payment (nurses working as private practitioners who receive fees directly from clients), reimbursement from both government and private third-party payers, and reallocation of existing revenues after nursing services have been sufficiently isolated from the overall health care package and identified with a commensurate price tag. The expanded role of nurses and the increased utilization of nurse practitioners have partially resolved some of the problems associated with access to health care. Reimbursement restrictions, however, greatly curtail the activities of nurse practitioners. It is envisioned that third-party reimbursement could provide nurses with sufficient economic leverage to demand nurse-patient ratios appropriate to the provision of professional services. Securing third-party reimbursement could enhance the authority needed by nurses to act on perceived nursing needs and could affect quality by allowing professional providers to perform their functions to the fullest extent possible. Ways in which nurses can educate consumers about their right to direct access to nursing services, and can become appropriately involved in third-party reimbursement are considered.

HRP-0029624/4 Not Available NTIS
Role of the Community Hospital in the Care of the Dying Patient and the Bereaved.
Elias Gerchick, Dorothy Huttunen, Austin H. Kutscher, and Daniel J. Cherico. 1977, 222p
Available from Arno Press, 3 Park Ave., New York, NY 10016.

This book consists of a series of essays pertaining to the role of the community hospital in caring for terminal patients and the bereaved. In it, physicians, nurses, social workers, psychologists, clergymen and volunteers evaluate their contribution to these patients; particular attention is given to psychosocial issues. In addition, the representatives of community agencies explore their roles and responsibilities in dealing with death-related situations. Consideration is given to the differences vis-a-vis thanatology between the medical center and the community hospital. The readings have been divided into the five groups, the first of which is concerned with caring for the patient. The remaining sections are concerned with the physician as caregiver, institutional resources for the patient and family and for the staff, community resources (e.g., a club for widowed persons, a community education program concerned with death), and conclusions. The areas touched on in the conclusions are hospital policy regarding care of the terminal patient and grief anticipation.

HRP-0029628/5 Not Available NTIS
Texas Woman's Univ., Dallas.
Perfecting Your Skills for Systematic Patient Assessments.
Barbara Dossey. 1979, 4p
Pub. in Nursing79 v9 n2 p42-45 Feb 79.

This article covers selecting and operationalizing the appropriate method for patient assessment, with particular emphasis on prompt assessment in the case of an emergency. The two most widely employed assessment methods are head-to-toe and major systems. Similar information is provided by both methods, but individuals must utilize their skills and perceptions in drawing conclusions from the information. Regardless of the method of assessment, four techniques are used to gather data for assessment: inspection (using the eyes to assess by observing the patient's appearance); palpation (using the hands to assess by feeling body parts); percussion (using the fingers to assess by striking the skin); and auscultation (using a stethoscope to listen to body sounds). Appropriate nursing interventions to resolve problems must be developed, and interventions must be reported to other members of the health care team. Assessment is a continuous process; it is necessary to reassess patients whenever their condition changes to evaluate progress or deterioration. In an emergency, the ability to relate all facts quickly and logically is crucial. Skills in assessment can help nurses determine whether to alter, expand, or discontinue specific actions, and evaluate the quality of patient care. Forms for head-to-toe and major system physical assessment are included.

HRP-0029638/4 Not Available NTIS
Veterans Administration Hospital, Perry Point, MD.
Adult Nurse Practitioner -- One of the Most Satisfying Nursing Roles.
Marie Joel. 1979, 3p
Pub. in Nursing79 v9 n1 p92, 94-95 Jan 79.

The work of the nurse practitioner is discussed in terms of typical patients, satisfaction and challenges, employment, and legislation. The responsibilities of nurse practitioners include physical examinations, laboratory test ordering, test results interpretation, drug therapy adjustment where indicated and education of patients. While collaboration with other health care professionals is necessary, the nurse practitioner has a great deal of independence. Some physicians positively accept this, but others are threatened by it. A guide has been published by the National Joint Practice Commission to help nurse practitioners establish good working relationships with physicians. The patients of nurse practitioners in Veterans' Administration hospitals all have chronic illnesses; half have psychiatric problems as well. Discussing patients' problems and helping them find solutions are both satisfying and challenging. Frustrations typically encountered are: too much time spent documenting direct patient care, and answering telephone calls from patients, and having to wait to confer with physicians. The average starting salary for adult nurse practitioners ranges from about $14,000 to $15,000 annually. Numerous States have or are in the process of updating their laws to include the expanded role in nursing. At the Federal level, the Rural Health Services Act of 1977 allows reimbursement only if States authorize care by nurse practitioners in statutory regulations.

HRP-0029639/2 Not Available NTIS
Conflict -- How to Avoid It and What to Do When You Can't.
Jeffrey Cooper. 1979, 3p
Pub. in Nursing79 v9 n1 p89-91 Jan 79.

Problems encountered when conflict among hospital personnel exists are addressed and ways of handling conflict are discussed. The challenge in the face of conflict is to get along despite differences. One of the best ways of dealing with conflict is simply to avoid it. Explosive confrontations are easier to stay away from than to handle once they arise. The responses of nurses indicate nine ways of avoiding conflict: (1) keep smiling; (2) make sure that all instructions given and received are clearly understood, since many conflicts involve a breakdown in communication; (3) practice saying 'would you please' instead of saying 'you must' in an effort to demonstrate tact; (4) do not be afraid to handle some of the unpleasant details of routine care; (5) give credit where credit is due; (6) try not to disagree in public; (7) avoid snap judgments; (8) stay away from gossip, particularly about the private lives of coworkers; and (9) leave personal problems at home. In dealing with conflict that does emerge, it is essential to keep lines of communication open and talk about the problem, to drop grudges after the crisis has passed, to propose a voluntary truce, to consult a higher authority, or to request a transfer if all else fails.

HRP-0029677/2 Not Available NTIS
Delaware Univ., Newark. Coll. of Nursing.
Nurse-Client Collaboration -- Dynamic Equilibrium in the Nursing Care System.
Elaine G. Boettcher. 1978, 9p
Pub. in Jnl. of Psychiatric Nursing and Mental Health Services v16 n12 p7-15 Dec 78.

Balanced collaboration between nurses and patients in the delivery of health care is discussed. In examining the concept of nurse-patient collaboration, attention is given to the relationship as an open system. Theories of the feedback loop in an open system and dynamic equilibrium are applied to the nursing care system. The objective of the nursing care system is to achieve and maintain a state of dynamic equilibrium, unless the system is dysfunctional or tends toward entropy. Mutual exchange of information (negative and positive feedback) between the nurse subsystem and the patient subsystem serves as a basis for achieving dynamic equilibrium in the nursing care system. Dynamic equilibrium is goal-directed toward health needs of patients. Seven aspects of the nurse-patient collaboration process are addressed: (1) inputs and outputs of the nurse-patient system, as related to patient health, are identified; (2) nurse and patient each compose goals related to health needs of the patient; (3) negotiation of identified differences between the two sets of goals takes place; (4) mutual goals are conjointly established; (5) a nurse-patient alliance is formed; (6) tasks required for goal accomplishment are assigned; and (7) evaluation of goal accomplishment is made. This process is illustrated in a case study, and a nurse-patient collaborative process record is included.

HRP-0029690/5 Not Available NTIS
Center for Research in Ambulatory Health Care Administration, Denver, CO.
Medical Group Practice Management.
Francis Foote Manning. 1977, 371p
Available from Ballinger Publishing Co., 17 Dunster St., Harvard Square, Cambridge, MA 02138.

The readings in this book pertain to management in the group practice of medicine. Following a brief review of medical group practice terminology, an organizational analysis of a group practice is presented. This discussion addresses the fundamental concepts and the organizational theory of a group practice, with attention to authority, responsibility, and accountability. An organizational chart showing the relationships between the administrator, the employees, and the physicians is included. The essays which follow are concerned with management style; legal considerations (the selection and use of legal advisors, the selection of a legal entity and organizational formats, and the legal

ramifications of organizational activities); relationships within a group practice setting between the manager and supervisors, physicians, and employees; and the features of the prepaid group practice setting, with attention to the job content, the scope of the functions facing the group practice administrator, types of prepaid health care plans, organizational structure and common operational components, relationships between physicians and the administrator, and Federal programs and the governmental role in encouraging prepaid group practice. Among the other topics dealt with are billing, collection, and insurance; the administrator's role in planning, financing, designing, construction, and renovation of new and existing facilities; and primary and secondary research.

HRP-0029691/3 Not Available NTIS
Washington Univ., Seattle. Dept. of Health Services.
Health Program Evaluation.
Stephen M. Shortell, and William C. Richardson. 1978, 143p
Available from C. V. Mosby Co., 11830 Westline Industrial Drive, St. Louis, MO 63141.

The major concepts, methodologies, and issues associated with evaluation of health services delivery programs are presented in a textbook aimed primarily at persons who will eventually be involved in administering, planning, delivering, and evaluating health services programs. The opening chapter covers the early background and historical development of program evaluation in the health field and factors having an effect on the current shape and content of program evaluation. The material which follows is concerned with issues surrounding the development of program objectives, levels and types of objectives, and design of program components; experimental and quasi-experimental designs applicable to health program evaluation, with particular attention to the pros and cons of each design as they relate to internal and external validity; issues pertaining to the reliability of individual measures; the advantages and disadvantages of various data collection techniques; administrative and political issues in program evaluation; problems of program evaluation; and future issues, with consideration given to the role of program evaluation in the development of public policy concerning health services delivery. A glossary of terms, problem exercises, and a list of suggested readings accompany each chapter. An example of a student's evaluation research paper is appended.

HRP-0029692/1 Not Available NTIS
California Univ., Los Angeles. School of Public Health.
American Health Care System -- Issues and Problems.
Paul R. Torrens. 1978, 120p
Available from C. V. Mosby Co., 11830 Westline Industrial Dr., St. Louis, MO 63141.

The purpose of this book is to explain to students and other interested persons how the U.S. health care system operates and why its current problems exist. The book opens with a discussion of the historical background for the development of U.S. health care services and an overview dealing with the way that contemporary health care services are organized. Among the topics considered are the elements of a health care system (e.g., emergency medical care, transportation), factors which have an effect on the utilization of a health care system, and various models of health care delivery (e.g., private practice and local government models, military and Veterans' Administration models). Subsequent material concentrates on issues and pressures affecting the U.S. health care system, including the need to better measure the results of health care, the uses of technology, and the question of who should have control of the system. Finally, the features of an 'ideal' model for a future U.S. health care system are discussed.

NTISUB/E/230-008 PC **A05**/MF **A01**
National Cancer Inst., Bethesda, MD. International Cancer Research Data Bank.
Histones.
Oncology Overview.
20 Nov 79, 92p NCI/ICRDB/OB-79/05

Oncology Overviews are a service of the International Cancer Research Data Bank (ICRDB) Program of the National Cancer Institute. Each Oncology Overview represents a survey of the literature associated with a selected area of cancer research. It contains abstracts of articles which have been selected and organized by researchers associated with the field. The purpose of the Overview is to facilitate and promote the exchange of information between cancer scientists by keeping them aware of literature related to their research being published by other laboratories throughout the world. Contents: Histone structure, complexity and variability; Chromatin structure and function; Histone synthesis and cell proliferation; Post-translational modifications of histones; Histones as components of tumor viruses; Role of histone in chromatin-agent interaction; Other cancer-related studies on histone effects.

N79-32935/5 PC **A02**/MF **A01**
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
A Deterministic Model in Biomathematics. Asymptotic Behavior and Threshold Conditions.
G. Aronsson, and I. Mellander. 1979, 24p CTH-MATH-1979-8
Contract SWED-NSRC-F-2569-007

A deterministic multigroup model for the spread of infectious diseases is studied. The model is of SIS-type (incubation and immunity are neglected) and allows seasonal variations in contact and recovery rates. Depending on the spectrum of a certain matrix there are two possibilities. Either the disease dies out naturally for every initial stage, or the disease prevalence in each group will approach a periodic (seasonal) fluctuation, provided the disease is present initially. This result generalizes a threshold condition by Lajmanovich and Yorke for the autonomous case (no seasonal variation).

N79-33231/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
Salyut-6-Soyuz: Our Commentary.
A. Burnazyan. Oct 79, 7p NASA-TM-75930
Contract NASW-3198
Tran-Transl. Into English from Pravda (Moscow), 5 Sep. 1979 p 5. Subm-Transl. By Scientific Translation Service, Santa Barbara, Calif.

The physical exercise and medical monitoring programs conducted during the Salyut-6-Soyuz space flight are discussed. A special suit for physical exercise which provides a load in the longitudinal direction of the body is described. A vacuum device to create reduced pressure and thus prevent disruption of blood circulation is reported. Medical examination of the cosmonauts upon landing and their reported health is discussed.

N79-33818/2 PC **E03**
National Aeronautics and Space Administration, Washington, D. C.
Aerospace Medicine and Biology: A Continuing Bibliography with Indexes, Supplement 197, September 1979.
Sep 79, 64p NASA-SP-7011(197)

This bibliography lists 193 reports, articles, and other documents introduced into the NASA scientific and technical information system in August 1979.

PB80-105182 PC **A12**/MF **A01**
Norris Cotton Cancer Center, Hanover, NH.
Evaluation of the Surveillance Epidemiology and End Results Program (SEER) of the National Cancer Institute.
Final rept. on Phase 1,
Curtis Bagne, Emily Fayen, E. Robert Greenberg, Susan Vogt, and Theodore Colton. Dec 78, 258p NCI-77/6
Contract N01-CP-7-1047

The descriptive incidence data for the Cancer Surveillance, Epidemiology, and End Results (SEER) Program are obtained from a group of population-based registries covering defined geographic areas which record for each cancer patient pertinent data on a standard list of characteristics including age, race, sex, place of residence, cancer site, and histologic type. These registries periodically produce statistical reports and supply data on individual patients in accordance with a uniform code. At present there are 14 cooperating units covering portions of the U.S. which were selected based on a number of factors including geographic location and state of readiness of the registries. This project will evaluate the current SEER Program to determine its adequacy and the need for additional participants to provide a statistically sound representative sample of incidence data across the U.S. The approach will be to examine present methods of deriving data on the present SEER participants, review characteristics of populations for other potential participants, and match sampling theory with sampling feasibility to produce defensible recommendations regarding the acquisition of required data.

PB80-105414 PC **A03**/MF **A01**
Oregon Legislative Assembly, Salem. Joint Interim Task Force on Mental Health Program and Policy Review.
Report of the Joint Interim Task Force on Mental Health Program and Policy Review.
Jul 78, 30p

The Mental Health Program and Policy Review Task Force was created to develop an overview of the recent shift in emphasis from institutional to community-based mental health care. The Task Force was charged with examining the effectiveness of community versus institutional care, current compliance with legislative directives, how priorities and minimum standards are set and security problems relating to care in both program sectors.

PB80-105570 PC **A03**/MF **A01**
Maine Dept. of Human Services, Augusta. Bureau of Health Planning and Development.
A Guide to Health Information, State Government (Maine).
Oct 78, 38p

The publication is a revision and update of the Guide to Health Information: State Government. The Guide to Health Information series was conceived to aid the researcher, planner and health professional in the location and retreival of health information. Companion volumes are the Guide to Health Information: Independent Agencies and Local Governments, and A Guide to Health Information: Federal Government and National Sources. The first such guide to health information was prepared by the State Health Information Project (SHIP) in 1974. Since that time, functions of the project have been absorbed by the Bureau of Health Planning and Development. This update reflects major changes in the organization of the data which hopefully will make the catalog more useful. The organization of each Guide is presented within major areas of interest (e.g. mental health). The present format was designed to coincide with federal guidelines concerning data related catalogs, including information on the agencies, data available, contact person and telephone number. In addition to these items, the Guide contains information on the form in which the data are available, frequency, and geographic area covered. Unless otherwise noted, the information listed is available in hard copy (paper) reports.

PB80-105893 PC **A10**/MF **A01**
Miami Univ., Coral Gables, FL.
An Evaluation of the Impact of Communications Technology and Improved Medical Protocol on Health Care Delivery in Penal Institutions. Volume IV. Telemedicine System Manuals.
Final rept.,
Jay H. Sanders, Louis Sasmor, and Thomas A. Natiello. Dec 76, 223p NSF/RA-761144
Grant NSF-GI-39471
Prepared in cooperation with Westinghouse Electric Corp., Pittsburgh, PA. Health Systems Div.

The use of non-physician health care providers (nurse practitioners) is combined with an interactive video communications system (telemedicine) for physical consultation and support to determine the efficacy and economic feasibility of such a system. An experimental protocol is established enabling the definitive, rigorously quantitative evaluation of all the parameters--quality of care, cost of care, patient and provider attitudes, and educational impact. This volume contains the operating manuals and maintenance manual for the telemedicine system hardware used in the study. The op-

erations manuals present operating instructions for the Main Jail, Stockade, Women's Detention Center (WDC), and Jackson Memorial Hospital Ward D telemedicine equipment. Also included here is a section on the operation of the slow-speed color video system at the WDC. The maintenance manual stresses maintenance of the interconnections between or modifications to commercially available components.

PB80-105935 PC **A04**/MF **A01**
New Jersey Assembly Banking and Insurance Committee, Trenton.
Public Hearing before Assembly Banking and Insurance Committee on Health Insurance, Held at Trenton, New Jersey on May 2, 1978.
2 May 78, 59p

The purpose of the hearing is to investigate the cost of health insurance, determine whether or not there are abuses, and find out as much information possible.

PB80-106214 PC **A07**/MF **A01**
Applied Management Sciences, Inc., Silver Spring, MD.
A Study of Health Manpower Needs Methodologies, Recommendations.
Final rept. Jun 77-Mar 78,
Thomas I. Litkowski, Randall E. Koran, and Robert T. Deane. 15 Mar 78, 138p BHM-77/3
Contract PHS-HRA-230-76-0260

The Health Professions Educational Assistance Act of 1976 (PL 94-484) directs the Secretary to evaluate and project the supply and requirements for health professions. There are currently a large number and variety of methods being used by different organizational units within PHS and by other health planning organizations to estimate and forecast health manpower requirements. The purpose of this project is to compile, review, compare, summarize and evaluate selected health manpower needs analyses, studies and activities developed by the Federal government and a small group of non-Federal agencies. The findings of the study will provide a basis for a work group report and recommendation for the Health Manpower Coordinating Committee on the use of methodologies by PHS and other selected agencies to estimate and forecast health manpower needs.

PB80-106248 PC **A03**/MF **A01**
Washington State Dept. of Social and Health Services, Olympia.
Report: Abortions, 1977 (Washington),
Lynda M. Sipes. Mar 78, 31p

The 26,939 abortions reported for the year were an 18.2% increase from calendar year 1976. The distribution of the number of abortions by age, marital status and procedure used, was in line with past experience. The age group 15-24 years included 69.8% of the total number of abortions. Women who had never married comprised 62.2% of the total as against 62.4% last year. The preferred procedure was suction in 93.9% of the cases, and 15,407 abortions (57.2% of the total) were performed in King County.

PB80-106644 PC **A09**/MF **A01**
Texas State Dept. of Health, Austin.
Six Year Plan for Public Health in Texas, September, 1979-August, 1985.
1979, 177p

The mission of the Texas Department of Health is to protect and promote better health for all people of this state. In order to accomplish this task, the Department must remain sensitive to and act on changing needs. Although there are common health activities and programs carried out by this Department and the health agencies of other states, local circumstances here in Texas have weighed heavily in determining priorities for new and different activities. In the fast-growing state of Texas, conditions vary greatly and programs must be modified, deleted, or new programs begun to meet the changing needs of the people. Population increases and the growth of new industries have not been uniform throughout the state, which has resulted in the necessity for designing health programs that differentiate between and accommodate the needs of various cultures, life-styles, and demographic features. Based upon these considerations, and after evaluation of its current operations and an estimation of the foreseeable needs, this Department has developed a six-year plan for public health in Texas.

PB80-112188 PC **A09**/MF **A01**
General Accounting Office, Washington, DC. Program Analysis Div.
Entering a Nursing Home - Costly Implications for Medicaid and the Elderly.
Report to the Congress.
26 Nov 79, 200p PAD-80/12

Medicaid has become the chief support of nursing home care for the chronically impaired elderly. However, many of these recipients could have remained in their own homes or communities if long-term health and social services were available to them. Factors leading to premature or avoidable institutional care include: Medicaid eligibility policies which create financial incentives to use nursing homes rather than community services; Barriers encountered by the elderly and their families who attempt to obtain community services; and Medicaid assessment procedures for determining the elderly's need for nursing home care. This report recommends to the Congress several changes to reduce avoidable nursing home use.

PB80-113582 PC **A03**/MF **A01**
Environmental Monitoring and Support Lab., Las Vegas, NV.
Preliminary Analysis of Cancer Rates in Primary Organic Chemical-Producing Counties.
Final rept.,
Amy J. Cross, and G. Bruce Wiersma. Jun 79, 32p EPA/600/1-79/022

The study is designed to determine whether there is an association between cancer mortality and the production of environmental carcinogens. Mortality rates of counties containing organic chemical production facilities are compared to rates of control counties. Twelve different cancer sites in lung, stomach, etc., and eight organic carcinogens were considered. Although a rigorous statistical analysis was not conducted, for most cancer sites mortality rates were found to be higher in counties of organic carcinogen production than in control counties. The study aids in the development of statistical techniques for determining the contribution of environmental contaminants to the rise in cancer rates. Research of this type assists in the identification of compounds that need to be regulated.

PB80-801614 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Lung Cancer (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Elizabeth A. Harrison. Dec 79, 152p
Supersedes NTIS/PS-78/1230, NTIS/PS-77/1095, NTIS/PS-76/0961, and NTIS/PS-75/841.

The bibliography cites research on the etiology, diagnosis, pathology, and therapy of pulmonary neoplasms. Studies are also included on neoplasms of other respiratory organs. Occupational related carcinogenesis is discussed. (This updated bibliography contains 168 abstracts, 25 of which are new entries to the previous edition.)

PB80-802077 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Epilepsy (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Elizabeth A. Harrison. Dec 79, 115p
Supersedes NTIS/PS-78/1225, NTIS/PS-77/1109, NTIS/PS-76/1004, NTIS/PS-75/889, and NTIS/PS-75/023.

The selected abstracts cover rehabilitation, diagnosis, electrophysiology, medical equipment, medical services, vocational guidance, and physical therapy as related to epilepsy. (This updated bibliography contains 105 abstracts, 13 of which are new entries to the previous edition.)

PB80-802184 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Rural Health Services. Volume 2. December, 1977-November, 1979 (A Bibliography with Abstracts).
Rept. for Dec 77-Nov 79,
Elizabeth A. Harrison. Dec 79, 200p
Supersedes NTIS/PS-78/1212, NTIS/PS-77/1086, NTIS/PS-75/532, and COM-74-11528. See also Volume 1, February, 1976-November, 1977, NTIS/PS-78/1211.

Primary health care, health planning, health care delivery systems, health resources, health care facilities, legislation, costs, and manpower are the subjects covered. Also included are studies on education, telemedicine, ambulatory health care, and mental health care. The bibliography excludes reports on emergency medical services. (This updated bibliography contains 191 abstracts, 93 of which are new entries to the previous edition.)

6F. Environmental Biology

AD-A075 170/1 PC **A05**/MF **A01**
Air Force Engineering and Services Center Tyndall AFB FL
An Evaluation of the Bird/Aircraft Strike Hazard at Selected Pacific Air Force (PACAF) Installations.
Final rept.,
Jeffrey J. Short, James S. Kent, and William H. Niemeier. Sep 79, 83p Rept no. AFESC-TM-5-79

Five Pacific Air Force (PACAF) installations were surveyed 9-26 May 1979 by the Air Force Engineering and Services Center's Bird/Aircraft Strike Hazard Team. During the survey, operational and environmental factors which combine to create bird strike hazards at each installation were observed. Specific recommendations based on observations are provided for each base to help reduce the hazard. (Author)

AD-A075 367/3 PC **A02**/MF **A01**
Naval Research Lab Washington DC
The Inhibitory Effects of Some Cinnamylphenols on the Marine Fungi 'Dendryphiella salina' and 'Corollospora maritima.
Interim rept.,
C. A. Bailey, K. K. Parrish, and J. D. Bultman. 31 Aug 79, 13p NRL-8331, AD-E000 326

Nineteen cinnamylphenols were evaluated for fungicidal worth against the marine fungi 'Dendryphiella salina' and 'Corollospora maritima'. 2-Cinnamyl-4-nonylphenol and 2-phenyl-4-cinnamylphenol were completely ineffective against 'Dendryphiella'; the remaining cinnamylphenols inhibited both fungi to varying degrees. 4-Cinnamylphenol, 4-(3-phenylpropyl)phenol, 2-cinnamyl-4,5-methelene-dioxyphenol, and 2-cinnamyl-4-methylphenol effectively inhibited both fungi, the criterion for effective inhibition being defined as 50% at 32 ppm; 2-cinnamyl-4-methylphenol and 2-cinnamyl-4-nonylphenol met this criterion against 'Corollospora'. 'Corollospora' was more sensitive to the cinnamylphenols than 'Dendryphiella' at equivalent concentrations. There was some relationship between chemical structure and the biological activity of these compounds. (Author)

AD-A075 439/0 PC **A03**/MF **A01**
Army Command and General Staff Coll Fort Leavenworth KS
An Analysis of Electromagnetic Pollution.
Master's thesis,
Henry K. Kellner. May 79, 31p

This document covers the effects of microwave and electromagnetic energy on everyday devices in use world wide. (Author)

AD-A075 584/3 PC **A05**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Oh School of Systems and Logistics
Development of a Bird/Aircraft Strike Hazard Assessment Methodology.
Master's thesis,
Jeffrey M. Jorgensen , and Kent G. Smith. 7 Sep 79, 79p Rept no. AFIT-LSSR-10-79B

This thesis effort was an attempt to identify a managerial tool that could be used to make decisions when comparing alternative methods of reducing bird/aircraft strike hazards. The general theory

was that there should be certain identifiable factors present on a base that affect the probability of a bird/aircraft strike. A relationship was developed by using information from several bases which related to their environment and aircraft operating procedures. Using multiple linear regression, a model was developed to explain how the base's strike rate is affected by these factors. The effort resulted in several conclusions and recommendations that could be used in further research efforts in this area of utmost importance to the Air Force. (Author)

COO-2874-4 PC **A02**/MF **A01**
Columbia Univ., New York. Dept. of Mathematical Statistics.
Evaluation of Research Strategies for Investigation of Health Effects of Air Pollution.
I. F. Goldstein, and M. Goldstein. Mar 78, 22p
CONF-7803105-1
Contract EY-76-S-02-2874
Symposium of the New York Academy of Medicine, New York, NY, USA, 23 Mar 1978.

The use of linear regression as a tool in epidemiological studies to relate health indices to pollution levels is criticized. Specifically, conclusions reached in an evaluation of SO sub 2 pollution in New York City, and its use as an indicator of air quality are criticized. Criticisms are classified into three categories: problems with the specification of the pollution variables; problems with meteorological variables, which affect health variables directly and also interact in a complicated way with the pollution variables; and problems with the health indices, the dependent variables in these studies. (ERA citation 04:052237)

N79-32743/3 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Laboratory Study of Annoyance to Combined Airplane and Road-Traffic Noise.
C. A. Powell. Sep 79, 40p NASA-TP-1478, L-12977

The annoyance of noise, which consisted of both separate and combined airplane and road-traffic noises, was studied. The subjects judged each session as to how annoyed they were in the simulated living room laboratory environment and as to how annoyed they were if they heard the noise in their home during day, evening, and night periods. The airplane noises, for equal session levels were judged significantly more annoying than the road traffic noises for the separate sessions. For the combined sessions, an interaction was found between the airplane noise and traffic noise levels, which was not adequately assessed by the total energy concept. Significant differences were found between the projected home responses for the day, evening, and night periods.

N79-32744/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A Summation and Inhibition Model of Annoyance Response to Multiple Community Noise Sources.
C. A. Powell. Sep 79, 23p NASA-TP-1479, L-12978

A model of annoyance due to combined noise sources was developed. The model provides for the summation of the subjective magnitudes of annoyance due to the separate noise sources and for the inhibition of the subjective magnitudes of each source by the presence of the other noise sources. The inhibition process is assumed to mathematically obey a power-group transformation. The results of an experiment in which subjects judged the annoyance of 15 minute sessions of combined aircraft and with several other models of combined source annoyance. These comparisons indicated that the model developed herein provides better qualitative and quantitative agreement with experimental responses than the other models. The application of the model to multiple community noises is discussed.

N79-32829/0 PC **A02**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
Effects of Acute Noise Traumata on Whole-Nerve and Single-Unit Activity.
G. F. Smoorenburg, and E. Vanheusden. 1978, 12p IZF-1978-23, TDCK-71654
Conf-Presented at 15th Workshop on Inner Ear Biol., Seefeld, Austria, Sep. 1978.

Some preliminary results of a research program on the effects of noise traumata on cochlear functioning are given. Measurements reported include the latency of the whole-nerve (compound) action potential (AP), the selectivity of frequency-tuning curves (e.g. the Q10-values) measured for the AP (with a forward-masking technique) and for single units in the antero-ventral cochlear nucleus, the degree of phase-locking of the action potentials of these units to the stimulus waveform, and the phase of the stimulus waveform to which these potentials are locked. The noise traumata were induced during the experiments. Results show that the AP latency increases after inducement of a noise trauma if the stimulus is presented at the same sound pressure level as before the trauma. An effect of the noise trauma on 010 values, although small, can be measured. Neither the AP latency data nor the response times calculated from single-unit data suggest that a decrease in the sharpness of tuning found after inducement of noise trauma is accompanied by a decrease of cochlear response times.

N79-32843/1 PC **A04**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
Tentative Evaluation of Annoyance Caused by Noise from Gunfire.
G. F. Smoorenburg. 1978, 52p IZF-1978-21, TDCK-71624
In Dutch; English Summary.

Based on an extensive survey of the pertinent literature a method was developed to determine the annoyance that may be expected from noise due to gunfire. This method may be applied to noise from both small and heavy firearms, and also to sonic booms. The annoyance to be expected is derived from the difference between the rating sound level and the noise criterion. The rating sound level is determined by the number of shots per day and the sound levels of the respective shots measured with the A-weighting and the impulse characteristic. Application of the impulse characteristic is based on properties of the hearing organ in the perception of short sounds. If the sound impulses contain a lot of low-frequency energy (heavy firearms, explosions, or sonic booms) the peak level of the sound impulse must be measured with linear frequency weighing. The rating sound level is determined by the lin, peak-level if this level exceeds the A, imp-level by more than 10 dB.

N79-33612/9 PC **A04**/MF **A01**
Maryland Univ., College Park. Dept. of Microbiology.
Study to Determine the Aquatic Biological Effects on the Solid Rocket Booster (Srb).
Final Report, 15 Dec. 1977 - 15 May 1979.
R. R. Colwell, and A. Zachary. May 79, 54p
NASA-CR-161307
Contract NAS8-32148

The surface of the reusable solid rocket boosters (SRB), which are jettisoned from the Shuttle Orbiter to parachute in the sea, are studied for colonization by marine life. Techniques for monitoring the marine microbial fouling of SRB materials are presented. An assessment of the nature and degree of the biofouling expected on the SRB materials in the recovery zone is reported. A determination of the degree and the effects of seasonal variation occurring on microbial fouling in the retrieval zone waters is made. The susceptibility of the SRB parachute recovery system to microbial fouling and biodeterioration is investigated. The development of scanning electron microscopy and epifluorescence microscopic observation techniques for rapid assessment of microbial fouling is discussed.

ORNL/TM-6803 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
White-Tailed Deer (Odocoileus Virginianus) on the Department of Energy's Oak Ridge Reservation: Data on Road-Killed Animals, 1969--1977.
J. D. Story, and J. T. Kitchings. Jul 79, 36p
Contract W-7405-ENG-26

During nine years (1969--1977), 126 white-tailed deer (Odocoileus virginianus) were killed by highway vehicles on the Department of Energy's Oak Ridge, Tennessee Reservation. Mortality was highest in the fall, and more males than females were killed among both fawns and adults. While traffic volume increased 8.2% annually, deer road-kills increased 43.8% annually. Increased road-kills were attributed primarily to an increase in the resident population. (ERA citation 04:052157)

PATENT-4 170 631 Not available NTIS
Department of Agriculture, Washington, DC.
Controlled Release Formulations of Douglas-Fir Beetle Anti-Aggregative Pheromone, 3-Methyl-2-Cyclohexen-1-One.
Patent,
James W. Young, and Malcolm M. Furniss. Filed 31 Jul 78, patented 9 Oct 79, 5p PB80-100951, PAT-APPL-929 866
Supersedes PB-288 638.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A method is described for significantly reducing Douglas-fir beetle (Dendroctonus pseudotsugae Hopk.) attacks on felled trees, through the use of the Douglas-fir beetle anti-aggregative pheromone, 3-methyl-2-cyclohexen-1-one (MCH), a highly volatile and water soluble material. Controlled release formulations of MCH can prevent the buildup of outbreak population of beetles in susceptible trees.

PB80-102791 PC **A10**/MF **A01**
Battelle Columbus Labs., OH.
Criteria for Assessment of Environmental Pollutants from Coal Cleaning Processes.
Final rept. Sep 76-Apr 79,
R. A. Ewing, B. W. Cornaby, P. Van Voris, J. C. Zuck, and G. E. Raines. Jun 79, 202p EPA/600/7-79/140
Contract EPA-68-02-2163

The report describes the development of criteria for assessing environmental pollutants associated with coal cleaning processes. The primary problem concerns emissions of pollutants to all three media--air, water, and land--and assessing their effects on humans and the environment. Pollutants associated with coal cleaning are primarily inorganic compounds associated with the ash fraction. Lists of potential pollutants from coal cleaning and utilization, containing hundreds of entries, have been proposed. Selected for investigation were 51 elements and 23 substances or groups of substances. The major criterion for ranking the importance of any pollutant is the relationship between its expected environmental concentration and the maximum concentration which presents no long-term hazard to humans or biota. Environmental concentrations depend on emission rates and the effects of physical transport and dispersion. Although these data will ultimately come from field measurements, for now they must be estimated. Methodology for these estimates are reviewed; the methodology is well developed and little further development appears necessary. Ecological transport and distribution is much less well developed: investigation shows large data gaps for many elements and species. Illustrative data are presented for eight of the more important trace elements.

PB80-106552 PC **A13**/MF **A01**
American Society for Microbiology, Washington, DC.
Proceedings of the Joint US/USSR Conference on the Production, Selection and Standardization of Entomopathogenic Fungi of Project V, Microbiological Control of Insect Pests, of the US/USSR Joint Working Group on the Production of Substances by Microbiological Means (1st) Held at Jurmula (Riga), Latvia, SSR on 20-21 May 1978.
Mar 79, 297p
Contract NSF-INT77-19256
See also PB-283 330-T. Trans. of Russian papers presented at Joint US/USSR Conference.

The conference dealt with the production, selection, and standardization of entomopathogenic

fungi. The objectives were to: (1) review past work and determine the current status of use of entomopathogenic fungi for controlling insect pests in both the USA and USSR; (2) define specific research objectives and scientists who will engage in collaborative research; and (3) develop a formal working document to assist in implementing research objectives. Presentations covered both basic and applied research on the feasibility of developing fungi for control of insect pests. Research in the USA and USSR has concentrated on species of Aschersonia, Beauveria, Entomopthora, Hirsutella, Metarhizium and Nomuraea. The foundation for a cooperative program on entomopathogenic fungi with the USSR under Project V, Microbiological Control of Agricultural Pests, has now been established.

PB80-109119 PC **A12/MF A01**
Franklin Research Center, Philadelphia, PA. Science Information Services Organization.
Investigation of Selected Potential Environmental Contaminants: Ethylene Glycol, Propylene Glycols and Butylene Glycols.
Final rept.,
Lynne M. Miller. May 79, 270p EPA/560/11-79/006
Contract EPA-68-01-3893

This report reviews aspects of production, use, environmental exposure and biological effects of ethylene glycol, two isomers of propylene glycol (1,2- and 1,3-propanediol) and four isomers of butylene glycol (1,3-, 1,4-, 2,3-, and 1,2- butanediol). Annual production of ethylene glycol is about 3.7 billion pounds for use primarily in antifreeze and polyester fiber. About 0.5 billion pounds of 1,2-propanediol are produced per year for use in polyester resins, food, pharmaceuticals, and cellophane. Annual domestic demand for 1,4-butanediol is about 0.2 billion pounds for use in the production of tetra-hydrofuran and acetylenic chemicals. The other title glycols are of less importance commercially. The major source of environmental contamination by ethylene glycol and 1,2-propanediol is likely from the disposal of spent antifreeze and deicing fluids. However, limited monitoring data make it difficult to adequately assess environmental exposure to the glycols. The glycols are capable of being degraded by a variety of acclimated and unacclimated soil, water, and sewage microorganisms. In humans, ethylene glycol intoxication, usually as a result of accidental ingestion of antifreeze, may result in nausea, hypertension, tachycardia, cardiopulmonary failure, renal impairment, coma and death. 1,2-Propanediol is a GRAS food additive of low toxicity. 1,3-Butanediol has been studied as a source of dietary energy. Few studies are available on 1,2-, 2,3- and 1,4-butanediol or on 1,3-propanediol.

PB80-112964 PC **A11/MF A01**
National Research Council, Washington, DC.
The Disinfection of Drinking Water.
Final rept.
Mar 79, 234p
Contract EPA-68-01-3169

The current status of theoretically possible methods for disinfecting drinking water is reviewed. The specific biocidal activity of each of the disinfectants is considered, as well as information (or lack of it) on the practical application and reliability of the methods.

PNL-2960 PC **A03/MF A01**
Battelle Pacific Northwest Labs., Sequim, WA. Marine Research Lab.
Food Web Transport of Trace Metals and Radionuclides from the Deep Sea: A Review.
J. S. Young. Jun 79, 32p
Contract EY-76-C-06-1830

This report summarizes aspects of the potential distribution pathways of metals and radionuclides, particularly Co and Ni, through a biological trophic framework after their deposition at 4000 to 5000 meters in the North Atlantic or North Pacific. It discusses (a) the basic, deep-sea trophic structure of eutrophic and oligotrophic regions; (b) the transport pathways of biologically available energy to and from the deep sea, pathways that may act as accumulators and vectors of radionuclide distribution, and (c) distribution routes that have come into question as potential carriers of radionuclides from the deep-sea bed to man. (ERA citation 04:052187)

UCID-18248 PC **A03/MF A01**
California Univ., Livermore. Lawrence Livermore Lab.
Health and Related Environmental Effects of Greatly Increased Coal Use.
W. J. Ramsey, and R. L. Thornton. 17 Aug 79, 29p
Contract W-7405-ENG-48

There is a wealth of information already published on the health and related environmental effects of coal use. However, thus far such information does not lead to rigorous conclusions regarding those effects. Uncertainty still exists as to which emissions pose the greatest hazards. A recent book summarizes well what is known about air pollution and human health. Several attempts have been made to assess injuries and deaths attributable to the coal utilization system from mining through electrical power generation. Environmental assessments of emerging coal conversion technologies are also being carried out. The high degree of uncertainty in these evaluations justifies concern about future health effects of greatly increased coal use. Neither can we be sanguine about the increasing levels of carbon dioxide in the atmosphere due to increasing fossil fuel combustion and their potential effects on climate. Large-scale changes in climate could lead to, among other effects, civil and international disorder because of a redistribution of areas of agricultural productivity and thus to considerable human suffering. (ERA citation 04:051098)

6G. Escape, Rescue, and Survival

AD-A075 392/1 PC **A03/MF A01**
Operational Research and Analysis Establishment Ottawa (Ontario)
Feasibility Study on a Canadian Civil SAR Plan for Search and Rescue Duties,
S. L. Milligan. Apr 79, 26p Rept no. ORAE-M87
Abstract in French.

The ability and willingness of the civil sector to assist the military in carrying out its statutory search and rescue (SAR) role is studied. Results are presented of a questionnaire to determine the available resources and general attitude. Existing civilian SAR groups are assessed to determine strengths and weaknesses of each type of organization. The role of federal and provincial government departments is explained. Recommendations include the development of a national volunteer SAR organization, which can be implemented in stages. (Author)

6H. Food

AD-A075 398/8 PC **A03/MF A01**
Federation of American Societies for Experimental Biology Bethesda MD Life Sciences Research Office
Evaluation of the Health Aspects of Certain Compounds Found in Irradiated Beef. Supplement I. Further Toxicological Considerations of Volatile Products.
Final rept. 1 Oct 77-31 Mar 79,
Herman I. Chinn. Mar 79, 26p
Contract DAMD17-76-C-6055
Supplement 1 to report dated Aug 77, AD-A045 716.

The recent literature is reviewed of the volatile compounds identified in irradiated beef. Of particular interest were the regulatory actions initiated by the Occupational Safety and Health Administration reducing the maximum acceptable concentration of benzene in the workplace atmosphere from 10 to 1 parts per million, because of the suspected leukemogenic action of the compound. This action is being contested in the courts. Hexane and toluene have been shown to produce neurologic symptoms when inhaled in high concentrations to achieve a state of euphoria. Some evidence suggests that methyl ethyl ketone (2-butanone) may have similar effects in inhalant abusers. Each of these compounds is found in irradiated beef but at levels several orders of magnitude less than those producing these toxic effects. The authors conclude that there is no evidence that consumption of reasonable quantities of beef irradiated in the described manner would constitute a hazard to health. (Author)

AD-A075 463/0 PC **A03/MF A01**
Federation of American Societies for Experimental Biology Bethesda MD Life Sciences Research Office
Evaluation of the Health Aspects of Certain Compounds Found in Irradiated Beef. Supplement II. Possible Radiolytic compounds.
Final rept. 1 Oct 77-31 Mar 79,
Herman I. Chinn. Mar 79, 40p
Contract DAMD17-76-C-6055
Supplement 2 to report dated Aug 77, AD-A045 716. See also Supplement 1, AD-A075 398.

Volatile products of beef irradiated with 56 kGy (5.6 Mrad) and approximately -30 C have been identified and their health aspects discussed in a previous report. In addition to these volatile radiolytic compounds, other, nonvolatile products are possible. This report attempts to identify the compounds which might result from beef irradiation; to estimate roughly the concentrations of such products; and to evaluate their possible hazard to health. There is very little carbohydrate in beef and its radiolytic products should be relatively innocuous in the amounts produced. Few radiolytic products have been identified from the protein component of beef. The bulk of radiolytic products found in beef has come from the fat moiety. Simple triglycerides have been studied extensively and sites of bond scission have been identified. The major products are fatty acids, diglycerides, and diol diesters. The concentrations of these classes have been estimated at approximately 0.5 to 1.0 g per kg irradiated beef. Lesser amounts of many other compounds are possible, including hydrocarbons of varying chain lengths, glycerol, monoglycerides, aldehydes, and ketones. The biological effects of each of these classes have been considered. (Author)

PB80-106412 PC **A04/MF A01**
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
Studying the Feasibility of Automatic Poultry Handling and Transfer Techniques in the Poultry Processing Industry.
Final rept.,
R. A. Cassanova, R. D. Atkins, and L. J. Moriarty. May 79, 67p NSF/RA-790171
Grant NSF-ISPT77-09749
Sponsored in part by Mar-Jac, Inc.

A project to determine the state-of-the-art in U.S. poultry processing equipment and to identify functions which could benefit by improved mechanization or automation is reported. The project is composed of three tasks: (1) to survey 12 broiler processing plants to determine current handling procedures, space limitations and constraints; (2) to evaluate the economic feasibility of alternate handling systems; and (3) to define the most practical and cost effective approach. Results suggest that many plants could be improved significantly by modernized equipment, tighter quality control, better training procedures for processing line personnel and a more dynamic personnel program. Specific handling concepts generated by the study deal with giblet stuffing equipment, a centralized monitoring system, an inventory control system, shackle identification, conveyor designs, hermetic seal applications, and a gamma ray weighing device. New releases describing the project together with numerous tables are included.

PB80-111529 PC **A02**
North Carolina State Univ. at Raleigh. Dept. of Food Science.
Effect of Thermal Processing on Minced Fish Gel Texture.
Sea Grant reprint,
C. S. Cheng, D. D. Hamann, and N. B. Webb. 1979, 8p UNC/SGR-134, NOAA-79092710
Grant NOAA-04-6-158-44054

Effects of rate of heating and final internal temperatures on the texture of fish gels were studied using mechanically deboned fish tissues of 2 species and 2 harvest locations. Generally, rapid heating to 85C internal temperature (using 100C steam) produced a firmer, more springy texture in

fish gels in comparison with those heated slowly to 70C internal temperature. However, these thermal effects on gel textures were species and harvest location dependent. Degradations of tropomyosin and myosin observed in cooked fish gels were highly related to gel textural properties. Results further suggested that changes in muscle proteins during heating were caused by proteolytic factor(s) in the sarcoplasmic fraction. A thorough understanding of these proteolytic factors and their subsequent control is important for the utilization of mechanically deboned fish tissues.

PB80-111537 PC **A02**
North Carolina State Univ. at Raleigh. Dept. of Food Science.
Effects of Species and Storage Time on Minced Fish Gel Texture.
Sea Grant reprint,
C. S. Cheng, D. D. Hamann, N. B. Webb, and V. Sidwell. 1979, 7p UNC/SGR-133, NOAA-79092711
Grant NOAA-04-6-158-44054

Protein functionalities were studied in comminuted fish gels from mechanically deboned fish tissues of four species after storage at 29C up to 12 months. Differences in gel textures, which were evaluated instrumentally and by a texture profile sensory panel, were evident among fish species and time in frozen storage. Fish gel texture was not significantly related to protein solubility of raw tissues, but was closely related to water-holding capacity and protein solubility of cooked gels. Degradation of tropomyosin and myosin probably occurred in some of the fish gels during thermal processing.

see individual report for order number and price
Federation of American Societies for Experimental Biology, Bethesda, MD. Life Sciences Research Office.
Evaluation of the Health Aspects of Food Ingredients.
Final rept.
1979,open series
Report of Select Committee on GRAS Substances.

The report, by a group of qualified scientists designated the Select Committee of GRAS Substances (SCOGS), provides an independent evaluation of the safety of nitrogen, helium, propane, n-butane, iso-butane, and nitrous oxide when used as gases in foods at present or projected levels.

FDA/BF-80/30. Nitrogen, Helium, Propane, n-Butane, iso-Butane, and Nitrous Oxide. 1979, 57p PC A04, MF A01 **PB80-112022**

FDA/BF-80-29. Niacin and Niacinamide. 1979, 41p PC A03, MF A01 **PB80-112030**

6J. Industrial (Occupational) Medicine

PB80-106701 PC **A04**/MF **A01**
Maine Bureau of Labor, Augusta. Research and Statistics Div.
Characteristics of Work-Related Injuries and Illnesses in Maine, 1977.
Jan 79, 68p BL-522
Grant DL-01-12-40-02-79
Prepared in cooperation with Maine Workers' Compensation Commission.

The tabulations presented in this publication are the results of the Supplementary Data System. The data are obtained from Employer's First Reports of Occupational Injury or Occupational Illness (ME Form 21) submitted to the Maine Industrial Accident Commission. Data were collected by the Maine Department of Manpower Affairs, Bureau of Labor, Research and Statistics Division. The S.D.S. Program is a Federal/State cooperative effort in conjunction with the U.S. Department of Labor, Bureau of Labor Statistics.

6K. Life Support

N79-32822/5 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Microbiological Evaluation of the Mobile Biological Isolator System.
D. M. Taylor, F. Morelli, W. Neiderheiser, and W. M. Tratz. 1 Jul 79, 61p NASA-CR-162293, JPL-PUB-79-48
Contract NAS7-100

Evaluations on critical components of the mobile biological isolation system were performed. High efficiency particulate air filter efficiency and suit integrity were found to withstand repeated ethylene oxide (ETO) sterilizations. The minimum ETO sterilization time required to inactivate all contaminant organisms was established at four hours. Two days of aerating at 120 F was found to dissipate all harmful ETO residuals from the suit. Donning and doffing procedures were clarified and written specifically for isolation rooms.

N79-33849/7 PC **A03**/MF **A01**
Lockheed Missiles and Space Co., Sunnyvale, Calif.
Spacelab Scrubber Analysis and Test Support.
Final Report.
30 Sep 79, 38p NASA-CR-161309, LMSC/D678552
Contract NAS8-32628

Contaminants to be used in qualification and development tests of the add-on charcoal bed scrubber were established, along with rates and methods for their introduction. The contaminant levels to be achieved were predicted and test results were analyzed.

6L. Medical and Hospital Equipment

AD-A075 229/5 PC **A02**/MF **A01**
Army Inst of Dental Research Washington DC
Rheology of Luting Cements,
L. Lorton, B. K. Moore, M. L. Swartz, and R. W. Phillips. 25 Sep 79, 19p
Paper presented at International Association for Dental Research Meeting, Washington, DC, 1978.

A rheometer has been developed to simulate the extrusion of luting cement from beneath a full crown during seating using clinically realistic shear rates. Five luting cements were studied and differences in rheological behavior were illustrated. These measurements demonstrate the importance of consideration of the effects of shear rate on viscosity when evaluating a cement for optimal clinical utilization. (Author)

6M. Microbiology:

AD-A075 072/9 Not available NTIS
Wright State Univ Dayton OH Dept of Biological Sciences
Drug Resistance Plasmid (pPL1) Mediated Changes in the Susceptibility of 'Pseudomonas aeruginosa' to Stress,
Peter H. Calcott, Cheryl Zaborowski, Wendy E. Levine, and Ngoc-Hai Truong. 8 Apr 79, 6p ARO-15525.3-L
Grant DAAG29-78-G-0084
Availability: Pub. in FEMS-Microbiology Letters, v6 p75-80 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 302/0 Not available NTIS
Clemson Univ SC Dept of Microbiology
Degradation of Cellulosic Substances by 'Thermomonospora curvata',
Fred J. Stutzenberger. 18 Sep 78, 4p ARO-13538.4-L
Grant DAAG29-76-G-0256
Availability: Pub. in Biotechnology and Bioengineering, v21 p909-913 1979 (No copies furnished by DTIC).

No abstract available.

PB80-111511 PC **A02**
North Carolina State Univ. at Raleigh. Dept. of Food Science.
Repair Detection Procedure for Enumeration of Fecal Coliforms and Enterococci from Seafoods and Marine Environments,
Sea Grant reprint,
C. R. Hackney, B. Ray, and M. L. Speck. May 79, 8p UNC/SGR-131, NOAA-79092708
Grants NOAA-04-6-158-44054, NOAA-04-8-M01-66
Pub. in Applied and Environmental Microbiology, v37 n5 p947-953 May 79.

The repair detection procedure of Speck et al. (1975) was adapted for the enumeration of coliforms, fecal coliforms, and enterococci in seafood and environmental samples. Samples were pour plated with Trypticase soy agar, followed by a 1- to 2-h incubation to effect repair; the plates were then overlaid with the selective medium and incubated. Violet red bile agar and an incubation temperature of 45 C were used as the selective conditions for fecal coliforms, and KF streptococcal agar was used for the enumeration of enterococci. The method was more efficient than the standard most-probable-number method for fecal coliform enumeration and also allowed enumeration of the injured cells, which might have remained undetected when selective medium in the most-probable-number method was used. The repair detection method effectively recovered the injured portion of the population of enterococci capable of growing on KF streptococcal agar. The repair enumeration method was not suitable for coliforms in marine samples because associative marine bacteria mimicked coliforms in violet red bile agar plates incubated at 35 C. The marine bacteria did not grow at 45 C and therefore did not interfere with fecal coliform enumeration.

PB80-112501 PC **A02**
North Carolina State Univ. at Raleigh. Dept. of Food Science.
Methods to Detect Stressed Microorganisms,
Bibek Ray. c1979, 12p SGR-130, NOAA-79092706
Grant NOAA-04-6-158-44054, Contract FDA-223-74-2098
Pub. in Jnl. of Food Protection, v24 n4 p346-355 Apr 79. Also pub. as North Carolina Agriculture Experiment Station, Raleigh, Journal Series paper no. 5653.

A population of surviving bacteria, after a sublethal physical or chemical treatment, is composed of the stressed or injured and the uninjured or normal cells. Injured cells develop sensitivity to many chemical compounds due to damage to their permeability barriers in the cell wall and the cell membrane. They also fail to repair this damage in the presence of selective compounds and consequently fail to multiply. However, the cells can repair this damage relatively rapidly in a nutritionally adequate environment in the absence of selective agents. Repaired cells regain their resistance to the selective compound and can multiply in a selective environment. Many nonsterile or semi-preserved foods are exposed to different kinds of sublethal treatments during processing, handling and storage and thus can contain indicator and pathogenic bacteria in the injured state. These organisms, because of their resistance to many selective compounds, are normally enumerated and isolated with selective media. The injured cells, due to their developed sensitivity will not be detected in these media. However, repaired cells can be detected in these media. Based on these principals two methods, designated as 'liquid-repair' and 'solid-repair' methods, have been developed in the laboratory.

6O. Pharmacology

AD-A075 050/5 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Lidocaine Treatment Following Baboon Endotoxin Shock Improves Survival.
Medical research progress rept.,
J. R. Fletcher, and P. W. Ramwell. 1979, 17p
Rept no. NMRI-79-33
Pub. in Advances in Shock Research, v2 p219-232 1979.

No abstract available.

N79-32839/9 PC **A03**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).

Effects of Amphetamine on Response Selection and Response Execution Processes in Choice Reaction Tasks.
H. W. Frowein. 1979, 27p IZF-1978-8, TDCK-71983
Subm-Sponsored by Found. For Med. Res. Fungo.

Two experiments to investigate the effect of an amphetamine derivative (phentermine HCL) on different stages in the reaction process were carried out. Experiment 1 showed that amphetamine shortened the reaction time, but this effect was additive with the effects of relative signal frequency and stimulus-response compatibility, which suggests that the amphetamine effect on the reaction time cannot be attributed to a specific effect on the response selection stage. Experiment 2 showed that amphetamine shortened the movement time in a target-aiming task. This effect was greater for longer movements but independant of target width, which suggests that amphetamine specifically affects the motor processes involved in the execution of aiming responses, but that the visual feedback processes during the movements were not affected by amphetamine. In addition, Experiment 2 showed an effect of amphetamine on the reaction time which was interpreted in terms of an amphetamine effect on the preparatory motor processes proceeding the aiming response. These findings are consistent with findings in the literature suggesting effects of amphetamine in motor tasks rather than in cognitive and perceptual tasks.

PB80-923700 Subscription
Food and Drug Administration, Rockville, MD. Bureau of Drugs.
FDA Drug and Device Product Approvals.
Monthly repts.
1979, 12 issues
Paper copy available on subscription, North American Continent price $36.00/year; all others write for quote.

The publication lists the New Drug Applications (NDA's), Antibiotic Form 5's and 6's, Abbreviated New Drug Applications (ANDA's) approved during the previous month. It also contains New Animal Drug Applications (NADA's), Biologic Licenses and Premarketing Device Application Approvals. Supplemental Application approvals are also listed.

6P. Physiology

AD-A075 046/3 PC **A02/MF A01**
Walter Reed Army Inst of Research Washington DC
Microwave Inactivation: A Technique with Promise and Pitfalls,
R. H. Lenox, P. V. Brown, and J. L. Meyerhoff.
Apr 79, 5p
Pub. in TINS p106-109 Apr 79.

No abstract available.

AD-A075 240/2 PC **A13/MF A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Sleep, Wakefulness and Circadian Rhythm.
Lecture series.
Sep 79, 285p Rept no. AGARD-LS-105

The Lecture Series is intended for those concerned with the management of civil, and particularly military personnel, who have to cope with irregular work and rest. It will provide an understanding of the physiological processes involved in the adaptation of man to disturbed sleep and wakefulness, and consider approaches to the problem of management including the use of drugs. The lectures will fall into three subject categories: Sleep, wakefulness and circadian rhythms. Physiological and psychological aspects - Adaptation of man to disturbed sleep and circadian rhythmicity - Management of irregular rest and activity. In the first part attention will be given to the physiological basis of sleep, wakefulness and circadian rhythms and the psychological correlates including performance relevant to personnel involved in skilled activity. The second part will review studies on the adaptation of man to unusual patterns of rest and activity with special reference to present day situations, and the third part will attempt to provide a basis for the management of disturbed rest and the rationality for the use of drugs. The series is designed for a wide range of interests in both the civil and military context, and for the land, sea and air environments. It is intended that the participants will include managers and operations staff as well as medical officers.

AD-A075 269/1 PC **A22/MF A01**
Langley Porter Neuropsychiatric Inst San Francisco CA
Human Evoked Potentials. Applications and Problems.
Final rept. 1 May 78-30 Apr 79,
Dietrich Lehman, and Enoch Callaway. 1979, 513p
Grant N00014-78-G-0023
Proceedings of the NATO Conference Konstanz, Germany, F. R., 25-28 Aug 78.

Human Evoked Potentials presents a multidisciplinary selection of recent papers discussing such topics as event related potentials in development, aging and dementia, color evoked potentials, and spatial and temporal distribution of olfactory evoked potentials and their measurement. Also examined are the uses of evoked potentials in the diagnosis of neuropathology, adaptation effects, and ERP scalp topography, as well as other physiological and psychological topics of interest. (Author)

AD-A075 458/0 PC **A02/MF A01**
Cornell Univ Ithaca NY
Primary Events in Vision.
Final rept. May 78-May 79,
Aaron Lewis. 4 Oct 79, 22p
Contract N00019-78-C-0306

Experiments on iodopsin and bacteriorhodopsin (which have thermal transitions from batho-iodopsin and batho-bacteriorhodopsin back to iodopsin and bacteriorhodopsin) suggest that light energy is stored as a result of the interaction of a photon with rhodopsin. Resonance Raman spectra of the batho intermediate in several rhodopsins indicate that the -C=NH+ stretching vibration does not vary in going from rhodopsin to bathorhodopsin and this suggests that there is still a double bond between C15 and N, and a positive charge on the N after the photonic event. Furthermore the C-CH3 vibration indicates that in bathorhodopsin there are changes in the vicinity of the CH3 groups, and it is interesting to note that these carbons are tertiary centers which can stabilize charge. Finally, even though the -C=NH+ vibration does not appear to be affected by the light event the C=C stretching vibration is significantly altered. These results indicate that light energy appears to be stored in a charge polarized state and at least in bacteriorhodopsin light emission is quenched in this state.

AD-A075 522/3 PC **A02/MF A01**
Naval Medical Research Inst Bethesda MD
A New Method for Measuring Pulmonary Ventilation.
Medical research progress rept.,
Mark E. Bradley, and Charles H. Robertson, Jr. 1978, 6p Rept no. NMRI-78-134
Pub. in C.E.G. Lundgren, Ed., Monitoring Vital Signs in the Diver, p59-61 1978. Proceedings of the Undersea Medical Society Workshop (16th), Rept. no. WS-78-2, Bethesda, MD. See also Rept. no. NMRI-78-48, AD-A060 473.

No abstract available.

N79-33822/4 PC **A04/MF A01**
National Aeronautics and Space Administration, Washington, D. C.
Experimental and Theoretical Investigations Concerning a Frequency Filter Behavior of the Human Retina Regarding Electric Pulse Currents.
Ph.D. Thesis.
A. Meier-koll. Sep 79, 58p NASA-TM-75372
Contract NASW-3199
Tran-Transl. Into English from Experimentelle und Theoretische Untersuchungen ueber Ein Frequenzfilterverhalten der Menschlichen Retina Gegenveber Electrischen Impulsstroemen, Tech. Hochschule, Fak. Fuer Maschinenwesen und Electrotech., (Munich) 1970 p 90. Misc-Orignal Language DOC. Was Announced as A71-14372. Subm-Transl. By Kanner (Leo) Associates, Redwood City, Calif.

Investigation involving patients with injuries in the visual nervous system are discussed. This led to the identification of the epithelial ganglion of the retina as a frequency filter. Threshold curves of the injured visual organs were compared with threshold curves obtained with a control group as a basis for identification. A model which considers the epithelial ganglion as a homogeneous cell layer in which adjacent neurons interact is discussed. It is shown the behavior of the cells against alternating exciting currents can be explained.

N79-33823/2 PC **A02/MF A01**
National Aeronautics and Space Administration, Washington, D. C.
Contribution to the Theory of Photopic Vision: Retinal Phenomena.
H. Calvet. Sep 79, 13p NASA-TM-75507
Contract NASW-3199
Tran-Transl. Into English from Sci. Tech. (Paris), 15 Oct. 1974 p 13-17. Misc-Original Language Document Announced as A75-17025. Subm-Transl. By Kanner (Leo) Associates, Redwood City, Calif.

Principles of thermodynamics are applied to the study of the ultramicroscopic anatomy of the inner eye. Concepts introduced and discussed include: the retina as a three-dimensional sensor, light signals as coherent beams in relation to the dimensions of retinal pigments, pigment effects topographed by the conjugated antennas effect, visualizing lights, the autotropic function of hemoglobin and some cytochromes, and reversible structural arrangements during photopic adaptation. A paleoecological diagram is presented which traces the evolution of scotopic vision (primitive system) to photopic vision (secondary system) through the emergence of structures sensitive to the intensity, temperature, and wavelengths of the visible range.

N79-33835/6 PC **A04/MF A01**
Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
Influence of Light Adaptation on Dark Adaptation Time for Pattern Recognition Tasks Einfluss der ART der Helladaptation Auf den Dunkeladaptationsverlauf bei Formerkennungsaufgaben.
E. Schubert. Sep 77, 62p FB-31
Language in German.

Night vision parameters such as acuity, adaptation, and accomodation were investigated. Physiological aspects of night vision together with eye/telescope interaction characteristics were studied. The effects of color, relative foreground/background illumination levels, and brightness levels, as well as choice of subjects (ships officers) for these experiments are discussed. Experimental setups used to simulate real conditions are described and results are graphically reported.

6Q. Protective Equipment

AD-A075 142/0 PC **A03/MF A01**
School of Aerospace Medicine Brooks AFB TX
A Search for a New Aircrew Spectacle Frame.
Final rept. Mar 77-Sep 78,
Benjamin Kislin, J. W. Miller, and Alton J. Rahe. Aug 79, 27p Rept no. SAM-TR-79-16

The factors necessary for a spectacle frame to meet acceptability for aircrew use were defined. The rising price of gold used in the HGU-4/P frame triggered triservice consideration for a change in materials and configuration of the aircrew spectacle frame. Optyl, a thermosetting plastic, presented potential for spectacle frame use in worldwide climates, and a field test was conducted to explore that potential and its acceptability by service personnel. The results were favorable for the use of thermosetting plastic based on the result of the analysis of wide-ranging questionnaire responses by Air Force subjects, and the reactions of opticians assembling the spectacles. At the end of the test period the HGU-4/P metal frame scored somewhat higher on overall acceptability than the Optyl 1019 frame. (Author)

AD-A075 426/7 PC **A03/MF A01**
Human Resources Research Organization Alexandria VA

Effects of Fatigue from Wearing the AN/PVS-5 Night Vision Goggles on Skills Involved in Helicopter Operations.
Technical rept. 13 May-29 Dec 78,
Garvin D. Chastain, and Albert L. Kubala. Jul 79, 49p HUMRRO-FR-WD-TX-78-18, ARI-RR-1217
Contract MDA907-78-C-2017

Reviews of the literature on rotary wing flight and interviews with aviators were conducted to determine which helicopter tasks and maneuvers are performed most frequently and/or are the most critical. Those operations found to be most critical were analyzed into perceptual and psychomotor components, and a battery of perceptual and psychomotor tests was selected to measure these factors. Aviators were tested both before and after flying with the AN/PVS-5 goggles. Eye-hand coordination was marginally affected following flight, and reaction time to lights was significantly affected. (Author)

6R. Radiobiology

AD-A075 253/5 PC **A04**/MF **A01**
Franklin Research Center Philadelphia PA Science Information Services Organization
Biological Effects of Nonionizing Electromagnetic Radiation. Volume IV, Number 1.
Quarterly rept. Jun-Sep 79,
Bruce H. Kleinstein, and Sheryl A. Dyner. Sep 79, 68p Rept no. 80G-C5003-01-VOL-4-1
Contract HO-A01-78-1157
A digest of current literature. See also Volume 3, Number 1, AD-A059 870.

This quarterly digest presents current awareness information on the biological effects of nonionizing electromagnetic radiation (microwave and radio frequency) in the range of 0 Hz to 100 GHz. The effects of magnetic and electric fields (static and alternating) are also covered. Each issue contains abstracts of English and foreign current literature, summaries of ongoing research investigations, news items, and a directory of meetings and conferences. (Author)

DOE/IR-0052 PC **A04**/MF **A01**
Department of Energy, Washington, DC.
Radiation Protection Enrollments and Degrees, 1978: Enrollments, Fall 1978, Degrees Granted, July 1966—June 1978.
Aug 79, 61p

This report presents the results of the eighth annual survey of Radiation Protection Enrollments and Degrees. Each year the survey is sent to institutions offering degrees in radiation protection and in other closely related fields (health physics, radiation health, radiological physics, radiobiology, and similar programs) whose graduates would be prepared to conduct, coordinate, direct, or plan a program for the evaluation and control of radiation hazards in various settings. Data are presented on enrollments and degrees, placement of graduates, women and minorities, foreign nationals, and regional distribution. 2 figures, 10 tables. (ERA citation 04:051786)

6S. Stress Physiology

AD-A075 107/3 PC **A03**/MF **A01**
Aerospace Medical Research Lab Wright-Patterson AFB OH
Mechanical and Physical Properties of the Human Intervertebral Joint.
Technical rept.,
Leon E. Kazarian, and Ints Kaleps. Jun 79, 29p Rept no. AMRL-TR-79-3

Human intervertebral joints were subjected to a constant stress, and the resultant strain response was measured as a function of time. Thereafter, the stress was partially removed and the strain again measured as a function of time. Based upon the data, an analytical/mechanical model was formulated for which the Young's Moduli and a coefficient of viscosity were determined. The measured data indicate marked differences in the compressive behavior of the intervertebral joint from the thoracic and lumbar column. Several types of disk degeneration were observed and studied. It is suggested that the disk acts as a sealed pressurized unit. If tears or ruptures occur in the joint whereby nuclear fluid can easily escape from the intervertebral disk and be in direct contact with the vertebral centrum the mechanical properties of the joint are significantly altered. (Author)

AD-A075 512/4 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
Ventilatory Muscle Training and the Oxygen Cost of Sustained Hyperpnea.
Medical research progress rept.,
Mark E. Bradley, and David E. Leith. 14 Jul 77, 11p Rept no. NMRI-78-138
Pub. in Jnl. of Applied Physiology, v45 n6 p885-892 1978.

No abstract available.

AD-A075 545/4 PC **A02**/MF **A01**
Naval Medical Research Inst Bethesda MD
The Effects of Degraded Visual and Tactile Information on Diver Work Performance.
Medical research progress rept.,
William W. Banks, and George S. Goehring. 1979, 10p Rept no. NMRI-79-41
Pub. in Human Factors, v21 n4 p409-415 1979.

No abstract available.

AD-A075 561/1 PC **A02**/MF **A01**
Army Research Inst of Environmental Medicine Natick MA
New Inventory for the Assessment of Symptom Occurrence and Severity at High Altitude,
John L. Kobrick, and James B. Sampson. 1979, 10p Rept no. USARIEM-M-14/79
Pub. in Aviation, Space, and Environmental Medicine, v50 n9 p925-929 Sep 79.

No abstract available.

6T. Toxicology

AD-A075 205/5 PC **A02**/MF **A01**
Army Environmental Hygiene Agency Aberdeen Proving Ground MD
Topical Hazard Evaluation Program of Candidate Insect Repellent AI3-36329a, 1-((6-Methyl-3-cyclohexen-1-yi)carbonyl)piperidine, April 1978 - June 1979.
Final rept.,
Allen W. Singer. Jun 79, 10p Rept no. USAEHA-75-51-0101-79

A preliminary hazard evaluation of AI3-36329a was performed by means of laboratory animal studies using rats, rabbits and guinea pigs. The technical grade compound caused mild primary skin and eye irritation in rabbits, and produced a photoirritation reaction. It did not sensitize guinea pigs or prove to be acute ingestion hazard . Ethanol solutions of AI3-36329a also produced primary skin irritation. It was recommended that AI3-36329a 1-((6-Methyl-3-cyclohexen-1-y1) carbonl)-piperidine, not be approved for further testing. (Author)

AD-A075 605/6 PC **A04**/MF **A01**
California Univ Irvine Dept of Community and Environmental Medicine
Cytologic Effects of Air Force Chemicals.
Annual rept. no. 3 1 Jul 78-30 Jun 79,
R. D. Benz, R. E. Rasmussen, A. M. Rogers, P. A. Beltz, and T. T. Crocker. Aug 79, 52p AMRL-TR-79-55
Contract F33615-76-C-5005

The research programs of the Cytology, Cell Biology and Cytogenetics Subprogram of the Toxic Hazards Research Unit for the period July, 1978 through June, 1979 are reviewed in this report. Sister chromatid exchange and micronucleus induction in dogs, rats and mice exposed in vivo and their cells in vitro; induced gene mutations in L5178Y mouse lymphoma cells; DNA synthesis inhibition in four in vitro cell lines; and the effects on cell proliferation in mice and rats have been studied. Chemicals tested for their effects include EMS, MMS, MMC, CP, Hz, MMH, SDMH, UDMH, DMN, JP-4, JP-5, JP-10, DFM, MCH, Decalin , DMSO, ETOH and MEOH. (Author)

BNL-50932 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Aquatics Task Force on Environmental Assessment of the Atikokan Power Plant: Effects on Aquatic Organisms.
G. R. Hendrey. Nov 78, 19p
Contract EY-76-C-02-0016

Possible impacts of an 800-MW coal-fired power plant to be built near Atikokan, Ontario were evaluated. It is feared that the emissions of SO sub 2 will lead to the deposition of sulfuric acid and result in the acidification of freshwaters in nearby parks and wilderness areas. The most obvious biological effects of acidification are damages to populations of fish. Less conspicuous but no less severe damages also occur to other organisms. It appears that all trophic levels are affected: species numbers are reduced, biomasses are altered, and primary production and decomposition are impaired. Field experiments and laboratory experiments indicate that microbial activity is reduced and that the recycling of materials is greatly impeded at low pH. This may interfere with nutrient supplies to plants and decrease the microbial biomass available to higher trophic levels. Phytoplankton densities decrease in acidified lakes and there is a reduction in some species of macrophytes. On the other hand, Sphagnum and benthic filamentous algae greatly increase in acidified conditions. The total primary productivity of lakes and streams may actually increase because of such dense growths on the bottom. Zooplankton and benthic invertebrate communities become less complex as acidity increases. This may in part be due to reduced food supplies, but direct inhibition by H sub 2 SO sub 4 has also been demonstrated. This removal of fish food organisms may exacerbate damage to fisheries, especially in the pH range of 5 to 6. When a lake loses all fish because of low pH, a few species of invertebrates may become very abundant. The salamanders Ambystoma jeffersonium and A. maculatum, sensitive to acidity below pH 7.0 and 5.0 respectively, are being eliminated from small ponds or temporary pools in the region around Ithaca, NY because of the impact of acid precipitation. Species of frogs in some lakes are also being eliminated because of acidification. (ERA citation 04:052221)

PB80-105554 PC **A04**/MF **A01**
Health Effects Research Lab., Research Triangle Park, NC. Clinical Studies Div.
Biochemical Changes in Humans Upon Exposure to Ozone and Exercise,
Suzanne Chaney, Paulette DeWitt, Wendy Blomquist, Keith Muller, and Robert Bruce. Aug 79, 53p EPA/600/1-79/026

A total of 44 human subjects were exposed to 784 micrograms/cu.m.(0.4 ppm) ozone and 30 human subjects were exposed to air as controls. A four hour exposure was given on each of five consecutive days. Half of each group received a higher level of treadmill exercise than the other half. Nine biochemical blood parameters were measured pre and post exposure: red blood cell glutathione reductase, vitamin E, red blood cell cholinesterase, red blood cell glucose-6-phosphate dehydrogenase, lactic acid dehydrogenase, complement C3, and IgM. Of these variables only vitamin E, red blood cell glucose-6-phosphate dehydrogenase, and complement C3 showed significant changes due to treatment.

PB80-112170 PC **A20**/MF **A01**
Research Triangle Inst., Research Triangle Park, NC.
Formulation of a Preliminary Assessment of Halogenated Organic Compounds in Man and Environmental Media.
Annual rept. Nov 76-Dec 78,
Edo D. Pellizzari, Mitchell D. Erickson, and R. A. Zweidinger. Jul 79, 469p EPA/560/13-79/006
Contract EPA-68-01-4731

The comprehensive report covers the information which has been gathered on this program during the past year. A model is developed for making a comparative assessment of halogenated organics in man and environmental media. This comprehensive report punctuates the first phase of the program.

PB80-115108 PC **A22**/MF **A01**
Research Triangle Inst., Research Triangle Park, NC.

Multimedia Environmental Goals for Environmental Assessment: Volume III. MEG Charts and Background Information Summaries (Categories 1-12).
Final rept. May 78-Jun 79,
G. L. Kingsbury, R. C. Sims, and J. B. White. Aug 79, 510p RTI-1603-23-01F-VOL-3, EPA/600/7-79/176A
Contracts EPA-68-02-2612, EPA-68-02-3132
See also Volume 1, PB-276 919, and Volume 4, PB80-115116.

Multimedia Environmental Goals (MEG's) are levels of significant contaminants or degradents (in ambient air, water, or land or in emissions of effluents conveyed to the ambient media) that are judged to be (1) appropriate for preventing certain negative effects in the surrounding populations or ecosystems, or (2) representative of the control limits achievable through technology. MEG's are projected for more than 650 pollutants. Volumes III and IV address 586 organic compounds. This volume relates to the following categories: Aliphatic Hydrocarbons; Alkyl Halides; Ethers; Halogenated Ethers and Epoxides; Alcohols; Glycols, Epoxides; Aldehydes, Ketones; Carboxylic Acids and Derivatives; Nitriles; Amines; Azo Compounds, Hydrazine Derivatives; Nitrosamines.

PB80-115116 PC **A21**/MF **A01**
Research Triangle Inst., Research Triangle Park, NC.
Multimedia Environmental Goals for Environmental Assessment: Volume IV. MEG Charts and Background Information Summaries (Categories 13-26).
Final rept. May 78-Jun 79,
G. L. Kingsbury, R. C. Sims, and J. B. White. Aug 79, 486p RTI-1603-23-01F-VOL-4, EPA/600/7-79/176B
Contracts EPA-68-02-2612, EPA-68-02-3132
See also Volume 3, PB80-115108.

Multimedia Environmental Goals (MEG's) are levels of significant contaminants or degradents (in ambient air, water, or land or in emissions of effluents conveyed to the ambient media) that are judged to be (1) appropriate for preventing certain negative effects in the surrounding populations or ecosystems, or (2) representative of the control limits achievable through technology. MEG's are projected for more than 650 pollutants. Volumes III and IV address 586 organic compounds. This volume relates to the following categories: Thiols, Sulfides, Disulfides; Sulfonic Acids, Sulfoxides; Benzene, Substituted Benzene Hydrocarbons; Halogenated Aromatic Compounds; Aromatic Nitro Compounds; Phenols; Halogenated Phenolic Compounds; Nitrophenols; Fused Polycyclic Hydrocarbons; Fused Non-alternant Polycyclic Hydrocarbons; Heterocyclic Nitrogen Compounds; Heterocyclic Oxygen Compounds; Heterocyclic S Compounds; Organophosphorus Compounds.

6U. Weapon Effects

AD-A075 135/4 PC **A03**/MF **A01**
Naval Surface Weapons Center White Oak Lab Silver Spring MD
Fish Killing Potential of a Cylindrical Charge Exploded Above the Water Surface.
Final rept.,
John F. Goertner. 12 Dec 78, 38p Rept no. NSWC/WOL/TR-77-90

Two special air-burst test geometries are compared with two typical underwater explosion test geometries in order to determine the relative hazard to swimbladder fish. The method consists of approximate calculations for extreme values of compression and extension of the fishes' gas-filled swimbladder in response to the explosion pressure waves. The kill probability is then calculated from the ratio of maximum to minimum radius during the oscillatory response using an experimentally determined function. Calculations are made for 1000-lb and 64,000-lb cylinders of H-6 explosive (L/D = 3.65) fired end-on, 1.3 diameters from the water surface. By assuming a uniform fish-density distribution throughout the water it is estimated that on the basis of fish-killed/kg explosive a typical underwater explosion is some 1000 times more hazardous for killing fish than these air-burst tests. (Author)

7. CHEMISTRY

7A. Chemical Engineering

AD-A075 338/4 PC **A03**/MF **A01**
Army Armament Research and Development Command Dover Nj Large Caliber Weapon Systems Lab
Detonation of Guanidine Nitrate and Nitroguanidine Manufactured via U/AN and BAF Processes.
Technical rept.,
J. Wendell Leach. Aug 79, 49p ARLCD-TR-78062, AD-E400 346
Includes errata sheet dated 18 Sep 79.

The objective was to derive detonation data for hazards analysis and for related safety design of facilities for manufacturing nitroguanidine by the urea/ammonium nitrate (U/AN) and the British aqueous fusion (BAF) processes. Critical diameter, propagation, sensitivity, and thermal characteristics of a number of mixtures and compounds, representative of selected streams in the processes, were determined. Critical diameter tests indicate that streams from the Evaporator Outlet, Mixed Reactor Feed, and the Liquid Reactor Outlet of the U/AN process will propagate when initiated with a booster and that they are mass-detonable. Thermal analysis tests on the stream mixtures indicate that they do not react violently when being heated to elevated temperatures but they do thermally decompose under these conditions. Propagation test results show that certain streams, peculiar to the U/AN process, propagate when detonated. However, propagation in 5.08 cm (2 in.) pipes was not complete on any mixture containing 25 percent or more water. The results also show that the process streams in the wet guanidine nitrate buildings, used in the BAF process, are not detonable; this is also true of cold melts (molten mixtures allowed to cool) in event of plant shutdown. The sensitivity (hazard) data on guanidine nitrate shows it is a relatively low-order explosive when compared to TNT, but that it is mass detonable. (Author)

COO-4507-4 PC **A03**/MF **A01**
Avco Systems Div., Wilmington, MA.
Arc--Coal Acetylene Process Development Program. Quarterly Technical Progress Report No. 4, October 1--December 31, 1978.
10 Jan 79, 29p
Contract EM-78-C-02-4507

Data taken from the Avco 200 kw Arc Coal Reactor facility provides increasing optimism for this acetylene producing process. Continued improvements in the reactor design have been accomplished over the past three months. These improvements result in data which, when reduced and analyzed, yield SER's well below 5.0. Further, these SER values are an improvement over those of the comparable OCR program test data results under the same test conditions. The anode and cathode designed for this 200 kw Chemical Facilities have performed well with no visible degradation after minor adjustments in the geometry and operating procedures. The data taken to date, both with and without quench, within this facility underline the importance of commencing work on the 1 Mw Arc Coal Acetylene PDU where SER values between 3.5 and 4.0 are a clear probability. With values of SER in this range, the arc coal process is economically attractive as a competitor to the ethylene process for manufacturing vinyl chloride monomer and vinyl acetate monomer. A summary of the 200 kw facility test results in Appendix A is a synopsis of a Topical Technical Report submitted earlier. (ERA citation 04:051195)

FE-1517-72 PC **A06**/MF **A01**
Fluor Engineers and Constructors, Inc., Irvine, CA.
Coal Liquefaction Test Center. Quarterly Technical Progress Report, July--September 1978.
Feb 79, 106p
Contract EX-76-C-01-1517

Three periods of integrated operation involved 44 hours of coal extraction with 3 hours of integrated operations; 30 hours of coal extraction with 21 hours of integrated operations; and 142 hours of coal extraction and integrated operations. The hydrogenation portion of the plant processed various mixtures of fresh and stored extract material for 3, 56 and 339 hours during these runs. Run 011 was terminated when level instrument malfunctions allowed the extract/solvent mixture to overfill the first reactor. The mixture congealed in the overhead cooler and plugged almost half of the tubes. Runs 012 and 013 were stopped when process fluids leaked through the internal pressure liner of a reactor recycle pump. In both cases the leak resulted in a fire. In Run 012 the incident occurred as the plant was being shut down due to operating problems with the carbonizer. The carbonizer problems resulted in the destruction of the internal lift-leg. The Run 013 incident happened during normal operations. The duration of integrated operations during Run 013 permits establishment of base conditions with which to compare future results. At an average hydrogenation temperature of 805 exp 0 F, disappearance of the +880 exp 0 F fraction in the hydrogenation feed (conversion) was 53%. The corresponding desulfurization was 90%. An average temperature of 735 exp 0 F was achieved in the extractor; the observed depth of extraction was typically 77%. The 560 exp 0 F temperature of the solvent deashing settling vessel was well below the preferred operating temperatures of 625 to 650 exp 0 F. The lower temperature is due to heat loss and will be compensated for in future runs by utilization of an idle fired heater to reheat the settler feed. (ERA citation 04:051005)

FE-2044-37 PC **A04**/MF **A01**
Rockwell International, Canoga Park, CA. Energy Systems Group.
Partial Liquefaction of Coal by Direct Hydrogenation. Annual Technical Progress Report, August 1977--July 1978.
C. L. Oberg, A. Y. Falk, and J. Friedman. Feb 79, 74p
Contract EX-76-C-01-2044

Rockwell International is developing a flash hydropyrolysis process for converting coal into high-value products. A high-mass flux, short-residence-time reactor is being used for this purpose. The process is based on a concept that high liquid yields are favored when coal is allowed to react with hydrogen for a brief period followed by rapid quenching. In the reactor, liquid products are formed initially, but these are further hydrogenated to gases if the reactions are not quenched. Rockwell has demonstrated successfully that flash hydropyrolysis can be carried out in an engineering scale reactor, with coal being processed at 1 ton/hr, which can be scaled directly to a commercial size. The reactor functions smoothly with caking (western Kentucky) coals and meets the coal conversion requirements of a commercial plant with no char product. During the first 9 months of the program, methods were developed for flowing the coal in dense phase with a small amount of transport gas. Cold-flow methods also were developed for characterizing the transport and mixing processes of the coal. Results from this characterization allow near-optimum design of the injector. The effectiveness of the reactor concept has been demonstrated in a series of tests. Twenty-one reactor tests were made at a nominal coal flow rate of 1/4 ton/hr. Twenty-four additional tests were made at a nominal coal flow rate of 1 ton/hr. (ERA citation 04:051006)

FE-2588-19 PC **A04**/MF **A01**
Amoco Oil Co., Naperville, IL. Research and Development Dept.
Study of Ebullated Bed Fluid Dynamics for H-Coal. Quarterly Progress Report No. 5, December 1, 1978--February 28, 1979.
I. A. Vasalos, E. M. Bild, and J. W. Jones. Mar 79, 74p
Contract EF-77-C-01-2588

Coal-fine plugging problems in the unit were alleviated by the addition of nitrogen purge lines to the system. To prevent plugging problems, lines are purged when the unit is shut down. Once a plug develops, the nitrogen blast is used to free the line. The initial catalyst level was lowered to prevent catalyst carryover in the recycle cup. Key experiments with nitrogen, kerosene, HDS-2A catalyst (3/16" length) and with coal concentrations of 11.5, 15, and 16.5 vol % were completed. Experiments with 16.5 vol % slurries were also conducted at 100 exp 0 F and 150 exp 0 F in addition to those at 75 exp 0 F. Bed expansions were deter-

mined with gamma-ray scans of the reactor length for each test. Liquid holdups were determined by gamma-ray scans and DP measurements. Data obtained at different reactor and operating conditions were correlated with models identified during the literature search. The liquid/catalyst data were correlated with the Richardson--Zaki equation. This relates the liquid holdup to the nth power to the ratio of liquid superficial velocity to the catalyst terminal velocity. The index, n, increases with coal char concentration and decreases with increasing temperature. Gas/liquid/catalyst data were correlated using the drift flux correlation of Darton and Harrison. It was found that increasing coal concentration and lowering temperature enhanced the transition from ideal bubbly to churn turbulent flow - the unstable bed operation. Additional data were also obtained by using argon-41 radioactive tracer tests. (ERA citation 04:051009)

FE-2766-13 PC **A10**/MF **A01**
Mobil Research and Development Corp., Paulsboro, NJ.
Gasifier Study for Mobil Coal to Gasoline Processes. Final Report.
R. Shinnar and J. C. W. Kuo. Oct 78, 201p
Contract EX-77-C-01-2766

In a previous paper, it was shown that the indirect route via gasification and synthesis provides a very promising route for high grade fuels, both for the near range and for the long range. The gasifiers and the associated offsites that produce the synthesis gas are a large part of the cost of a complex to produce high quality transportation fuels. The thermal efficiency of this gasification step is also a large contribution to the overall thermal efficiency of the complex. To fully utilize the advantage of this route, it is important to develop better gasifiers and to match the synthesis processes such that they take full advantage of such a gasifier. The objective of this study was to evaluate which of the gasifiers presently under development could meet this goal. This study shows that synthesis gas at the lower ratios of H sub 2 to CO and steam to oxygen has inherent thermal efficiency advantages which arise from basic scientific and engineering principles. Gasifiers that can be made to operate consistent with these principles have a substantial cost advantage. The cost advantages are demonstrated by a differential economic analysis essentially independent of the absolute values of the cost basis. The British Gas Corporation-Lurgi slagging gasifier, which is present close to commercialization, conforms closely to the basic requirement and potentially could produce syngas at a low production cost relative to other gasifiers such as the dry ash Lurgi gasifier. The H sub 2 to CO and steam to oxygen ratios of this gasifier are about 0.5 to 1.3, respectively, very close to the best theoretical values of 0.45 and 1.6, respectively. The low H sub 2 to Co ratio gasifiers have to be matched with syngas conversion processes that use such low ratios. (ERA citation 04:051010)

N79-32393/7 PC **A06**/MF **A01**
Rheinische Braunkohlenwerke A.G., Cologne (Germany, F.R.). Abt. Forschung und Entwicklung.
Research and Development Work for Hydrogasification of Coal with Nuclear Processing Heat Done in the Framework of the Prototype Nuclear Processing Heater Project.
Final Report.
L. Schrader. Nov 78, 120p BMFT-FB-T-78-25
Contract BMFT-PLE-ET-1399-C
In German; English Summary.

A technique for coal gasification using nuclear processing heat was developed, then studied following the construction of a pilot plant for hydrogasification in a fluidized bed with an input of 100 kg coal/hr. This process for the production of synthetic natural gas or carbon monoxide and hydrogen gas containing mixtures is shown to have the advantages of saving feed coal, improving efficiency, reducing emissions, and stabilizing energy costs. The design, construction, and operation of the pilot plant are described. Components have been proven for the hydrogasification of brown coal and rock coal. Results demonstrate the suitability of this unit as a part of a large scale gasification plant.

N79-32394/5 PC **A05**/MF **A01**
Bergbau-Forschung G.m.b.H., Essen (Germany, F.R.). Abt. Physikalische Chemie.
Research and Development Concerning Steam Gasification of Coal: Report on the Concept of a Prototype Plant Using Nuclear Processing Heat.
Final Report.
K. H. Vanheek. Dec 78, 93p BMFT-FB-T-78-29
Contract BMFT-03E-1399-A/ETS-0004-1
In German; English Summary.

The development of a coal gasification process using a high temperature nuclear reactor to meet the energy requirements of the process is described. A key point in the development is the gas generator in which the nuclear heat is transferred into a fluidized bed of coal and steam via an intermediate loop and a heat exchanger immersed in the bed. On the basis of former results concerning reaction kinetics and heat transfer, further experiments with different devices were performed and the program for the testing and the development of new alloys to be used was continued. A pilot plant (0.2 T/hr) using an electrically heated helium loop was constructed and is now in operation. The data gathered confirm the feasibility of the gas generator as well as the process and are being used for the design of bigger plants.

7B. Inorganic Chemistry

AD-A075 264/2 PC **A03**/MF **A01**
Pennsylvania State Univ University Park Dept of Chemistry
Synthesis of Tetranuclear Mixed-Metal Clusters via the Reaction of Co(CO)4- with Closed Metal Carbonyl Trimers. Crystal and Molecular Structure of (Ph3P)2NCoRu3(CO)13.
Interim technical rept.,
Paul C. Steinhardt , Wayne L. Gladfelter A. Dale Harley , Joseph R. Fox , and Gregory L. Geoffroy. 3 Oct 79, 40p Rept no. TR-79-2
Contract N00014-77-C-0417

The new clusters HCoRu3 (CO)13, HCoRu2Os(CO)13, HCoRuOs2(CO)13, and HCoOs3(CO)13 have been synthesized by allowing K(Co(CO)4) to react with Ru3(CO)12, Ru2Os(CO)12, RuOs2(CO)12, and Os3(CO)12, respectively, followed by protonation. Reaction of KCo(CO)4 with Fe3(CO)12, Fe2Ru(CO)12, and FeRu2(CO)12 followed by acidification did not lead to the desired hydrido mixed-metal clusters but instead to various other products. Reaction of (PPN)(Co(CO)4) (PPN= (Ph3P)2N) with Fe3(CO)12 and Ru3(CO)12 without subsequent acidification gave the salts (PPN)(CoFe3(CO)13) and (PPN)(CoRu3(CO)13). The latter was structurally characterized by single crystal X-ray. It crystallizes in the space group P1 with Z= 2 and unit cell dimensions a = 9.783(5) Angstrons, b = 14.768(5) Angstrons, c = 18.675(5) Angstons, Alpha = 110.39(3) deg, Beta = 99.02(4) deg, Gamma = 91.44(4) deg, and V = 2489(4) Angstrons 3. Diffraction data (0 deg < 20 < 50 deg) were collectedwith an Enraf-Nonius CAD4 automated diffractometer, using graphite-monochromat ized MoK Alpha radiation, and the structure was refined to R = 0.036 and RW = 0.044 for 6150 independent reflections with I greater than or equal to 3.0 sigma (I). The molecule contains a tetrahedral CoRu3 core with each Ru atom bonded to three terminal carbonyls, the Co atom bonded to one terminal carbonyl, and with a carbonyl ligand bridging each of the three Co-Ru bonds. Analogous reactions of (PPN)(Co(CO)4) with Fe2Ru(CO)12 and FeRu2(CO)12 gave products formulated as (PPN)(CoFe2Ru(CO)13) and (PPN)(CoFeRu2(CO)13) but these salts were not obtained pure. (Author)

7C. Organic Chemistry

AD-A075 080/2 Not available NTIS
Pennsylvania State Univ University Park Dept of Chemistry
Preparation of (NP(p-OC6H4Li)2)3 by Metal-Halogen Exchange, and Its Reactions with Electrophiles,
T. L. Evans , T. J. Fuller , and H. R. Allcock. 15 Aug 78, 1p ARO-15783.3-C
Grant DAAG29-78-G-0190
Availability: Pub. in Jnl. of the American Chemical Society, v101 p242 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 453/1 PC **A03**/MF **A01**
Oklahoma Univ Norman Dept of Chemistry
Phosphoric Acid Derivatives of Tin. I. Triorganotin(IV) Dithiophosphate Esters.
Technical rept.,
J. L. Lefferts , K. C. Molloy , J. J. Zuckerman , I. Haiduc , and C. Guta. 17 Sep 79, 36p Rept no. TR-11
Contract N00014-77-C-0432
See also Part 2, AD-A074 588.

Twelve triorganotin dithiophosphate esters, R3SnS2P(OR prime)2, where R=C6H5- and R prime=CH3-, C2H5-, n-C3H7-, i-C3H7, N-C4H9-, i-C4H9 and C8H5-; and R=CH3- and R prime=CH3-, C2H5-, n-C3H7- and i-C3H7-; and R-C6H11- and R prime=i-C3H7- were synthesized in high yield by the condensation of the organotin hydroxide with the 0,0 prime-diorganodithiophosphoric acid to release water which was distilled azeotropically, or taken up in an alcohol solvent corresponding to the phosphoric acid ester group, or by the reaction of the triorganotin chlorides with an alkali metal salt of the dithiophosphoric acid. (Author)

7D. Physical Chemistry

AD-A075 031/5 Not available NTIS
Virginia Univ Charlottesville Dept of Chemistry
Electron Capture Negative Ion Chemical Ionization Mass Spectrometry,
Donald F. Hunt , and Frank W. Crow. 1979, 7p ARO-14293.3-C
Grant DAAG29-76-G-0326
Availability: Pub. in Trace Organic Analysis: A New Frontier in Analytical Chemistry, NBS-SP-519, p601-607 Apr 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 039/8 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB Ma
New Vibrational Quantum Number Assignments for the UV Absorption Bands of Ozone Based on the Isotope Effect,
D. H. Katayama. 20 Mar 79, 7p Rept no. AFGL-TR-79-0199
Pub. in Jnl. of Chemical Physics, v71 n12 p815-820 Jul 79.

No abstract available.

AD-A075 042/2 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB Ma
Sulfuric Acid in KBr Pellet Spectroscopy,
Frederic E. Volz. 2 Apr 79, 3p Rept no. AFGL-TR-79-0203
Pub. in Applied Optics, v18 n14 p2353-2354, 15 Jul 79.

No abstract available.

AD-A075 061/2 PC **A04**/MF **A01**
Dayton Univ Oh Research Inst
Status of Chemical Instrumentation and Analytical Programs in the Air Force.
Final rept. 1 May-30 Sep 79,
Wendell E. Rhine. 1 Aug 79, 52p UDR-TR-79-69, UDR-NM-FR-97-20, AFOSR-TR-79-1061
Contract F49620-79-C-0097
Proceedings of the AFOSR Workshop, Dayton, OH. 14-15 Jun 79.

This report presents the final proceedings for the workshop on 'The Status of Chemical Instrumentation and Analytical Programs in the Air Force' organized by the University of Dayton Research Institute (UDRI) under Contract No. F49620-79-C-0097. The workshop was held on June 14 and 15, 1979 and was held at the Imperial House North Motel, Dayton, Ohio with Dr. Wendell E. Rhine (UDRI) and Dr. Kent J. Eisentraut (Air Force Materials Laboratory) as co-chairmen. The proceedings are included under the major headings: Meeting Agenda, Abstracts and List of Attendees. This workshop was sponsored by the Air Force Office of Scientific Research (AFOSR) with Mr. Denton W. Elliott as Program Manager. (Author)

AD-A075 068/7 Not available NTIS
Utah Univ Salt Lake City Dept of Chemistry
Thermodynamic Properties of Solid C2H4,
Shao-Mu Ma , and Henry Eyring. 21 Feb 79, 4p ARO-15477.5-C

Grants DAAG29-78-G-0029, NSF-CHE76-17836
Availability: Pub. in Proceedings of the National Academy of Sciences USA, v76 n6 p2495-2498 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 069/5 Not available NTIS
Purdue Univ Lafayette Ind Dept of Chemistry
Carbene Photocycloelimination from a Vinyl-Cyclopropane,
Michael Pallmer , and Harry Morrison. 3 Apr 78, 3p ARO-13088.7-C
Grant DAAG29-76-G-0066
Availability: Pub. in Jnl. of The Chemical Society Chemical Communications, p558-559 1978 (No copies furnished by DTIC).

No abstract available.

AD-A075 079/4 Not available NTIS
Pennsylvania State Univ University Park Dept of Chemistry
A Spirocyclophosphazene with Iron-Phosphorus Bonds and a P-Fe-Fe Three-Membered Ring,
Paul P. Greigger , and Harry R. Allcock. 19 Jan 79, 1p ARO-15783.1-C
Grant DAAG29-78-G-0190
Availability: Pub. in the Jnl. of the American Chemical Society, v101 p2492 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 088/5 Not available NTIS
Georgia State Univ Atlanta Dept of Physics
Photoionization of Highly Stripped Atomic Ions: Relativistic Calculations,
Warren Ong , Steven T. Manson , H. K. Tseng , and R. H. Pratt. 13 Sep 78, 3p ARO-14560.4-P
Grant DAAG29-77-G-0068
Prepared in cooperation with Pittsburgh Univ., PA. Dept. of Physics and Astronomy.
Availability: Pub. in Physics Letters, v69A n5 p319-321, 8 Jan 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 125/5 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Extraction of Mineral Acids by Aliphatic Amines,
Yu. G. Frolov , and V. V. Sergiyevskiy. 31 May 79, 25p Rept no. FTD-ID(RS)T-0554-79
Edited trans. of Trudy Moskovskiy Khimiko-Tekhnologicheskiy (USSR) n51 p116-123 1966, by Marilyn Olaechea.

No abstract available.

AD-A075 154/5 PC **A02**/MF **A01**
Hull Univ (England) Dept of Chemistry
Carbon Dioxide Formation in Oxidation of Propionaldehyde,
Roy R. Baldwin , Keith A. Lewis , and Raymond W. Walker. 13 Dec 77, 11p AFOSR-TR-79-1047
Grant AFSOR-73-2450
Pub. in Combustion and Flame, v34 p275-283 1979.

No abstract available.

AD-A075 184/2 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Metallic Hydrogen,
Tse-An Hsu , and Tse-Wan Chu. 12 Jan 79, 19p Rept no. FTD-ID(RS)T-2177-78
Edited trans. of Wuli, Institute of Physics, Academy Sin., (China) v6 55 p296-300 1977.

No abstract available.

AD-A075 190/9 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Dependence of the Extraction Capacity of Amines on Their Ionization Potentials,
V. M. Makarov. 9 Apr 79, 15p Rept no. FTD-ID(RS)T-0509-79
Edited trans. of Radiokhimiya (USSR) v12 n4 p584-590, by Victor Mesenzeff.

No abstract available.

AD-A075 218/8 PC **A02**/MF **A01**
Vermont Univ Burlington Dept of Chemistry
Organosubstituted Phosphazenes. XII. He(I) Photoelectron Spectra of Selected Pheynl- and p-N,N-Dimethylaminophenylfluorocyclotriphosphazenes.
Technical rept.,
Christopher W. Allen , and Jennifer C. Green. 1 Oct 79, 23p Rept no. TR-4
Contract N00014-77-C-0605
See also report dated 1 Jul 78, AD-A056 607.

He(I) photoelectron Spectra are presented for P3N3F6-n (C6H5) (n=1,2,4) and P3N3F5C6H4N(CH3)2. Ionization energies are discussed in terms of perturbations of molecular orbitals of the parent aryl and phosphazene functions. The data confirm the strong electron withdrawing effect of the P3N3F5 moiety and show a dramatic decrease in this effect as fluorine atoms are replaced by phenyl groups. One also observes a significant destabilization of the phosphazene out of plane pi molecular orbital as the fluorine atoms are replaced by phenyl groups. The ionizations from the phenyl pi a2 and pi b1 orbitals are unresolved in phenyl phosphazenes thus demonstrating the lack of significant phosphazene - aryl mesomeric interactions. The electronic effect of the electron donating dimethylamino substituent on the phenyl unit is transmitted to the phosphazene through the sigma bond system. (Author)

AD-A075 254/3 PC **A03**/MF **A01**
Michigan State Univ East Lansing Dept of Chemistry
Triple Quadrupole Mass Spectrometry for Direct Mixture Analysis and Structure Elucidation.
Interim technical rept.,
R. A. Yost , and C. G. Enke. 3 Oct 79, 30p Rept no. TR-3
Contract N00014-76-C-1092
Prepared in cooperation with Florida Univ., Gainesville. Dept. of Chemistry.

The triple quadrupole mass spectrometer is shown to be a simple and highly efficient system for the observation of the fragmentation pattern of selected ions. The instrument consists of, in series, a CI/EI ion source, a quadrupole mass filter, an RF-only quadrupole collision chamber, a second mass filter, and an electron multiplier. The high sensitivity of the MS/MS technique with quadrupoles depends particularly on the highly efficient low energy collision-induced dissociation process in the strong focusing RF quadrupole field. Detection limits for methane and nitrobenzene of 10 to the minus 15 mole are shown. Analysis of a mixture of six components, including two isomers and an isobaric compound is presented. Chemical noise is virtually eliminated by the selection of both parent and fragment ion. An application of the system for structure elucidation is also described. (Author)

AD-A075 255/0 PC **A02**/MF **A01**
Michigan State Univ East Lansing Dept of Chemistry
The Fragmentation of the Ions of Nonan-4-One: A Study by Triple Quadrupole Mass Spectrometry.
Interim technical rept.,
R. A. Yost , and C. G. Enke. 3 Oct 79, 21p Rept no. TR-4
Contract N00014-76-C-1092
Prepared in cooperation with Florida Univ., Gainesville. Dept. of Chemistry.

The fragmentation of the ions of the compound nonan-4-one were studied in detail with low-energy collision-induced dissoiciation (CID) in a triple quadrupole mass spectrometer. Ions of the sample molecule created in an EI source are mass selected by a quadrupole mass filter, dissociated by low-energy collision with neutral molecules in a quadrupole collison chamber, and the dissociation products are mass-selected by a second quadrupole mass analyzer. The normal EI mass spectrum of nonan-4-one shows 47 fragment ions. A fragmentation spectrum is obtained for each of the ions from the EI source. The result is the positive identification of over 400 parent-daughter pairs. This compares with a total of 47 observed pairs (37 confirmed) from all previous metastable ion studies. Normal alkanone fragmentations are observed: Alpha-cleavage, loss of CO or C2H4 from Alpha-cleavage ions, and McLafferty rearrangement in the long chain. The relative abundances of the short chain and long chain Alpha-cleavage fragments are demonstrated to depend on the fragmentation energy available with the long chain fragment predominating at lower energies. The fragmentations observed are grouped for discussion. A number of parent-daughter structures and fragmentation mechanisms are confirmed and some new ones are proposed. New graphical representations of the fragmentation patterns have been devised to accommodate the large amount of information produced in this study. (Author)

AD-A075 263/4 PC **A02**/MF **A01**
Sri International Menlo Park Ca
Nitrous Acid as an Oxidant in Acidic Media.
Final rept. 15 Jul 76-31 May 79,
David S. Ross , and Georgina P. Hum. 25 Sep 79, 21p ARO-13754.2-CX
Contract DAAG29-76-C-0060

It has been found that benzyl and aliphatic alcohols are rapidly oxidized by nitrous acid to the corresponding carbonyl compound at 25 degrees C in 50-70% sulfuric acid. The oxidations are very rapid, complete within minutes for most substrates; the process appears to be quantitative, at least in runs with alcohol concentrations in the 10 to the -14 M range. For the benzyl alcohols, an electron withdrawing para-substituent, such as nitro, retards the rate, while an electron donating group, such as methyl, increases the rate. Thus, some cationic character must be present in the process. The rate increases with increasing acidity, peaking at 60% sulfuric acid, and declining thereafter. Surprisingly, ethers are oxidized as well, with the most unlikely case, the methyl ether of 2-phenyl-2-propanol, cleanly and rapidly yielding acetophenone. For primary and secondary alcohols and their ethers, the proposed mechanism for oxidation includes initial electrophilic attack by NO+ on oxygen, followed by elimination of HNO. In these cases, the nitrous acid is regenerated, probably through HNO oxidation by dissolved oxygen. Thus, an equivalent of nitrous acid oxidizes more than one equivalent of alcohol. For the tertiary alcohol case, we suggest elimination of alkyl nitrite; however, the mechanistic details remain to be fully established. (Author)

AD-A075 299/8 Not available NTIS
State Univ of New York At Stony Brook Dept of Chemistry
Photon Correlation Measurements of Colloidal Size Distributions. II. Details of Histogram Approach and Comparison of Methods of Data Analysis,
B. Chu , Esin Gulari , and Erdogan Gulari. 16 Jun 78, 11p ARO-13245.11C
Grant DAAG29-76-G-0005
Availability: Pub. in Physica Scripta, v19 p476-485 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 300/4 Not available NTIS
Colorado State Univ Fort Collins Dept of Chemistry
A Ligand Field Theory Analysis of the Spectra of the T2G3 Levels of IrF6,
J. D. Webb , and E. R. Bernstein. 21 Mar 78, 11p ARO-14771.1-C
Grant DAAG29-77-G-0133
Availability: Pub. in Molecular Physics, v37 n5 p1509-1519 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 351/7 PC **A03**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Ms Structures Lab
The 7.6-Angstrom Reaction Product in Smectite Clay-Lime Mixtures.
Final rept. 1 Jul 74-30 Sep 77,
Alan D. Buck , and Katharine Mather. Sep 79, 32p WES-SL-79-22, CTIAC-41

Several mixtures of hydrated lime with one of three smectite (swelling) clays and water were made. Some mixtures contained fly ash and a little calcite. The strength and mineralogical composition were followed by X-ray diffraction as a function of age. The intent was to grow usable single crystals of 7.6-Angstrom reaction product. When this proved impractical a pure sample of small crystals were hand-picked and studied. This showed that

the 7.6-Angstrom material that formed in these mixtures was tetracalcium aluminate carbonate-11 hydrate (monocarboaluminate). The type of exchangeable cation in the clay had no effect on the reaction. On the other hand the presence of magnesium rather than aluminum in the octahedral layer of the clay mineral hectorite prevented the usual reactions because these mixtures never hardened. (Author)

AD-A075 394/7 PC **A02**/MF **A01**
Irt Corp San Diego Ca
Annual Summary of Molecular Beam Studies of Low Energy Reactions.
Annual summary rept.,
R. H. Neynaber , and S. Y. Tang. 15 Oct 79, 5p
Rept no. IRT-8103-009
Contract N00014-74-C-0011

The annual summary of the research performed under ONR Contract No. N00014-74-C-0011 is given. The report describes merging and crossed-beam studies of chemi-ionization and/or ion-molecule reactions. Included are investigations of the He(*) - D, Ne(*) - Xe, Ar(*) - Kr(*), Ne(*) - Ar(*), He(*) - Ne(*), and Kr(+) - Cs systems. A description is also given of how this research helps resolve unknown aspects of the areas investigated. (Author)

AD-A075 562/9 Not available NTIS
Defence Research Establishment Ottawa (Ontario)
Solvent Orientation at the Electrode/Electrolyte Interface.
Technical note,
C. L. Gardner. 1 Nov 74, 4p Rept no. DREO-TN-75-6
Availability: Pub. in Electroanalytical Chemistry and Interfacial Electrochemistry, v61 p113-116 1975 (No copies furnished by DTIC).

No abstract available.

AD-A075 563/7 Not available NTIS
Defence Research Establishment Ottawa (Ontario)
Anodic Passivation by 'CdO' Studied by ESR,
E. J. Casey , and C. L. Gardner. 3 Sep 74, 4p
Rept no. DREO-721
Availability: Pub. in Jnl. of the Electrochemical Society, v122 n7 p851-854 Jul 75 (No copies furnished by DTIC).

No abstract available.

AD-A075 567/8 PC **A02**/MF **A01**
Scripps Institution of Oceanography La Jolla Calif Geological Research Div
Determination of Tin(IV) and Organotin Compounds in Natural Waters, Coastal Sediments and Macro Algae by Atomic Absorption Spectrometry,
Vernon F. Hodge , Sharon L. Seidel , and Edward D. Goldberg. 10 Jan 79, 7p
Contract N00014-75-C-0152
Pub. in Analytical Chemistry, v51 n8 p1256-1259 Jul 79.

No abstract available.

ANL/EES-TM-21 PC **A03**/MF **A01**
Georgia Univ., Athens.
Sampling and Sample Handling Procedures for Priority Pollutants in Surface Coal Mining Wastewaters.
R. S. Hayden, D. O. Johnson, and J. D. Henricks. Mar 79, 28p
Contract W-31-109-ENG-38

The report describes the procedures used by Argonne National Laboratory to sample surface coal mine effluents in order to obtain field and laboratory data on 110 organic compounds or classes of compounds and 14 metals and minerals that are known as priority pollutants, plus 5-day biochemical oxygen demand (BOD sub 5), total organic carbon (TOC), chemical oxygen demand (COD), total dissolved solids (TDS), and total suspended solids (TSS). Included are directions for preparation of sampling containers and equipment, methods of sampling and sample preservation, and field and laboratory protocols, including chain-of-custody procedures. Actual analytical procedures are not described, but their sources are referenced. (ERA citation 04:051053)

ESDU-79019 PC**$386.50**
Engineering Sciences Data Unit Ltd., London (England).
Thermal Conductivity of Liquid Aliphatic Diesters.
Data item.
c1979, 16p
Also pub. as ISSN-0141-4062.
For information on availability of series, sub-series, and other individual data items, write: NTIS, Attn: ESDU, Springfield, VA. 22161.

This Item presents values of thermal conductivity at saturation pressure, in tabular form, for the liquid aliphatic diesters which are members of the following groups: dialkyl oxalates, dialkyl malonates, dialkyl succinates, dialkyl glutarates, dialkyl adipates, dialkyl pimelates, dialkyl suberates, dialkyl azelates, and dialkyl sebacates. The data on which these recommended values of thermal conductivity are based are the most reliable available and the range covered is from the melting point to approximately 0.9 of the critical temperature. In common with other ESDU Data Items, quantities are expressed in SI Units and conversion factors to other units are provided. The procedure used to obtain the values of thermal conductivity are presented and the effect of pressure is indicated. (Copyright (c) Engineering Sciences Data Unit Ltd., 1979.)

FE-2496-29 PC **A04**/MF **A01**
Carnegie-Mellon Univ., Pittsburgh, PA. Environmental Studies Inst.
Characterization of Hydrogen Cyanide Production in Coal Gasification.
D. V. Nakles. Jul 79, 62p
Contract EX-76-S-01-2496

In the past, the characterization of hydrogen cyanide production has been accomplished by the examination of the raw product gas quench condensate. Based on these examinations, a normalized hydrogen cyanide production in the range of 3(10 exp -6) to 4(10 exp -2) pounds per ton of moisture-and-ash-free (MAF) coal has been determined. These production rates imply that the processing and treatment problems associated with hydrogen cyanide may be minimal in coal gasification. However, the previous quench condensate characterization efforts were inadequate due to: The lack of verified sampling methods; the lack of verified preservation and analytical techniques; and the inefficiency of the quench operation in removing cyanide from the raw product gas. Improved characterization techniques have focused on the characterization of both the liquid and gas phase quench effluents as well as the raw product gas prior to the quench operation. In particular, the quench condensates have been characterized using preservation and analytical techniques tailored to address the idiosyncrasies of the gasification wastewaters. These techniques were developed and verified on a variety of synthetic and pilot plant process samples. The quenched product gas was examined using a specially designed on-line sample train. The combined results of these efforts were used to determine the efficiency of cyanide removal in the various quench operations and provide an estimate of total hydrogen cyanide production. Based on these efforts, hydrogen cyanide production in coal gasification has been assessed to be in the range of 0.01 to 1.3 pounds per ton of MAF coal. These data are significantly higher than previous results and indicate that cyanide production may be significant and should not be considered negligible when considering various liquid and gas phase effluent treatment. (ERA citation 04:050981)

N79-32316/8 PC **A03**/MF **A01**
National Physical Lab., Teddington (England). Div. of Chemical Standards.
Correlation and Estimation of Vapor-Liquid Critical Properties. Part 2: Critical Pressures and Critical Volumes of Organic Compounds.
D. Ambrose. May 79, 48p NPL-CHEM-98

A method of correlating critical temperatures was established. The method is extended to critical pressures and critical volumes, utilizing for these properties the methods of correlation proposed by Lydersen. Numerous determinations of critical properties have been made since Lydersen's work was published and as a result some additions and minor modifications to the original scheme of increments are proposed. A point of difference between this presentation and its predecessor is that the structure of alkanes is expressed differently and the increments for these compounds, both for critical pressures and critical volumes, were obtained by least squares analysis by computer. This method was also used with the values of Y and V for the haloalkanes for determination of the increments for halogens. In general, the methods described follow the same pattern as the earlier critical temperature correlation.

N79-32343/2 PC **A04**/MF **A01**
Helsinki Univ. of Technology, Espoo (Finland). Inst. fuer Prozessmetallurgie.
Ueber den Einfluss von Magnesiumoxyd-Zusatz Auf die Reduction des Wuestits (Effect of a Magnesium Oxide Additive on the Reduction of Iron Oxides).
Master's thesis,
J. Haerkki. 1978, 72p TKK-V-A3(1978), ISBN-951-751-299-6
Subm-Sponsored by Ges. Outokumpu Oy and Tech. Fuer Wirtsch. Beihilfe.
Language in German.

The reduction of iron oxide to metallic iron in blast furnaces, or by direct reduction was studied using hydrogen. Magnesium oxide additives diminish the reduction rate constant when the iron oxide is highly nonstochiometric, but increases it when the nonstochiometry is low. Optical and scanning electron microscopy were used to study material characteristics and structures. Theoretical considerations are discussed.

N79-32535/3 PC **A03**/MF **A01**
Merck (E.), Darmstadt (Germany, F.R.). Chemische Forschung und Entwicklung.
Nematic Liquid Crystals for Display Systems.
Final Report.
R. Eidenschink, J. Krause, and L. Pohl. Dec 78, 27p BMFT-FB-T-78-41
Contract BMFT-NT-637
In German; English Summary.

Liquid crystals suitable for use in flat display devices working on the principle of either a dynamic scattering mode, the twisted nematic cell, the DAP effect, or a cholesteric-nematic phase transition were developed and studied. Nematic single substances were synthesized and liquid crystalline mixtures composed in response to the requirements of display device manufactures. Two classes of substances suitable for electro-optic purposes were found. One nematic phase for dynamic scattering, five phases for the twisted nematic cell, several test mixtures for multiplexing, and one phase for the cholesterol-nematic phase transition were developed. Furthermore, several azo dyes suitable for liquid crystal color switches were synthesized.

N79-33034/6 PC **A03**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Single Electron Capture Into Ar(+) Excited States in Ar2 (+) Na Collision Below 12 Kev. 1: Absolute Measurement of Emission Cross-Section.
A. Matsumoto, S. Tsurubuchi, K. Okuno, S. Ohtani, and T. Iwai. Aug 79, 26p IPPJ-410

Emission spectra between 2800 and 6000 A were observed at the ionic energies from 0.2 to 12 keV. Absolute measurements of emission cross-sections were made for the emission lines coming from Ar(2+) excited states at 4 and 8 keV with a crossed-beam technique. Processes of single-electron capture into the Ar(2+) 4p- and 4p'-states, with exothermicity of a few eV, take place dominantly while the endothermic processes producing Ar(2+) in the 4d- and 5s-states occur with small cross-sections. The sum of the cross-sections for electron capture into the excited states observed is comparable with the total single-electron capture cross-section estimated from attenuation measurements of ion currents. Possible errors and uncertainties are discussed.

N79-33950/3 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

The Equilibrium State.
J. A. Bittencourt. Jul 79, 50p INPE-1518-RPE/054

A simple derivation of the Maxwell-Boltzmann velocity distribution function is presented which is based on the general principle of detailed balance from statistical mechanics, and the concept of summation invariants. The physical meaning of the Maxwell-Boltzmann distribution function is discussed and its properties are analyzed. It is shown that the equilibrium distribution function is the most probable distribution consistent with the macroscopic constraints of the system, and it is also the state having maximum entropy. A derivation is given for the equilibrium distribution function in the presence of an external conservative force, and the Boltzmann factor is introduced. Finally, an analysis of the Saha equation, which specifies the degree of ionization of a gas in thermodynamic equilibrium at a given temperature is presented.

N79-33986/7 PC **A02/MF A01**
California Inst. of Tech., Pasadena. Kellogg Radiation Lab.
Energy Dependence of the Trapping of Uranium Atoms by Aluminum Oxide Surfaces.
K. G. Librecht. Oct 79, 12p NASA-CR-162362, BAP-18
Contracts NGR-05-002-633, NSF PHYS-76-83685

The energy dependence of the trapping probability for sputtered U-235 atoms striking an oxidized aluminum collector surface at energies between 1 eV and 184 eV was measured. At the lowest energies, approximately 10% of the uranium atoms are not trapped, while above 10 eV essentially all of them stick. Trapping probabilities averaged over the sputtered energy distribution for uranium incident on gold and mica are also presented.

PB80-100712 Not available NTIS
National Bureau of Standards, Washington, DC.
Improved 100 Degrees S Point and Pol.
Final rept.,
A. L. Cummings, B. Coxon, H. P. Layer, and R. J. Hocken. 1979, 14p
Pub. in Proceedings of the Technical Session on Cane Sugar Refining Research (1978) Held at Washington, DC. on September 17-19, 1978, p191-204 1979.

A newly constructed polarimeter, and highly purified sucrose were used to redetermine the hundred degree point of the saccharimeter scale at 546 nm wavelength. The result differs from previously reported results by 140 to 500 ppm. In addition to the low pressure mercury discharge lamp, lasers at 546 nm and 633 nm wavelengths have been advantageously employed as polarimeter light sources. Lasers improved the sensitivity, accuracy and reproducibility of measurements and decreased the measurement time. These and related investigations open the door to future improvements in the determination of the pol of technical sugars.

PB80-100720 Not available NTIS
National Bureau of Standards, Washington, DC.
Mechanical Behavior of a Highly Oriented Polyethylene Rod.
Final rept.,
J. M. Crissman, and L. J. Zapas. 1977, 9p
Pub. in Jnl. of Polymer Science 15, p1685-1693 1977.

Dynamic mechanical and single step stress relaxation data are presented for a highly oriented linear polyethylene rod as produced by a high pressure extrusion technique. The results indicate that both major relaxation processes normally observed in unoriented polyethylene are virtually absent in torsion, whereas they are present in flexure. Stress relaxation in torsion data show a very highly nonlinear behavior when compared to similar data for an unoriented polyethylene rod.

PB80-100761 Not available NTIS
National Bureau of Standards, Washington, DC.
Revision, By Proton, Carbon-13, and Nitrogen-15 N.M.R. Spectroscopy, of the Structure Assigned a Bis(hexopyranosyl) -Amine Derivative.
Final rept.,
B. Coxon, and L. Hough. 1979, 11p
Pub. in Carbohydrate Research 73, p47-57 1979.

Structural analysis of the acetylated, minor product of the reaction of methyl 2,3-anhydro-4,6-O-benzylidene-alpha-D-mannopyranoside with ammonia by high-field proton- and 13C-n.m.r. spectroscopy, and also 15N-n.m.r. spectroscopy, has shown that this acetyl derivative is bis(methyl 2-O-acetyl-4,6-O-benzylidene-3-deoxy-alpha-D-altropyranosid-3-yl)amine, and not the N-acetyl derivative reported previously. The configuration and conformation of the bis(altropyranosid-3-yl)amine derivative have been determined, and its unusually large 1J(15NH) coupling constant is discussed.

PB80-100837 Not available NTIS
National Bureau of Standards, Washington, DC.
The Effects of Strong Excitation-Phonon Coupling on Mixed Crystal Spectra: Diphenylmethylene in Benzophenone.
Final rept.,
R. J. M. Anderson, B. E. Kohler, and J. M. Stevenson. 15 Aug 79, 5p
Pub. in Jnl. of Chemical Physics 71, n4, p1559-1563, 15 Aug 79.

Low temperature absorption and emission spectra are presented of diphenylmethylene in benzophenone. Although the spectra are broad at temperatures greater than about 20K, considerable structure appears at lower temperatures. The spectra and their temperature dependence are readily explained by a large excitation-phonon coupling which is expected for this type of mixed-crystal system.

PB80-103773 Not available NTIS
National Bureau of Standards, Washington, DC.
Spectrum and Energy Levels of Triply Ionized Lanthanum (La IV).
Final rept.,
G. L. Epstein, and J. Reader. Apr 79, 10p
Pub. in Jnl. of the Optical Society of America 69, n4, p511-520, Apr 79.

The spectrum of La IV has been observed in a sliding spark discharge with the NBS 10.7-m normal incidence vacuum spectrograph and the NBS 10.7-m Eagle spectrograph in air. A total of 368 lines have been observed in the region from 300 to 5000 A. Because of the greatly contracted 4f orbital, the lowest excited configuration is 5p 5 4f. All configurations have been theoretically interpreted. The energy parameters determined from least-squares fits to the observed levels are compared with Hartree-Fock calculations. Some new measurements for La III are presented that confirm the 1967 results of Odasbasi.

PB80-103781 Not available NTIS
National Bureau of Standards, Washington, DC.
Direct Determination of Barium in Sea and Estuarine Water by Graphite Furnace Atomic Spectrometry.
Final rept.,
M. S. Epstein, and A. T. Zander. Jun 79, 4p
Pub. in Analytical Chemistry 51, n7, p915-918, Jun 79.

Seawater samples from the Gulf of Alaska and estuarine water samples from the York River in Virginia near the Chesapeake Bay are directly analyzed for barium concentration using graphite furnace atomic emission spectrometry. The accuracy of the method is evaluated by a correlation of results with data from analyses using line source and wavelength-modulation continuum-source atomic absorption spectrometry and graphite furnace atomization, as well as the analysis of a standard reference water sample. Interferences in the analysis and techniques used to overcome them are discussed.

PB80-103815 Not available NTIS
National Bureau of Standards, Washington, DC.
Energetics of Methyl Branches in Hydrocarbon Crystals.
Final rept.,
B. L. Farmer, and R. K. Eby. Mar 79, 4p
Pub. in Polymer 20, p363-366, Mar 79.

Semi-empirical energy calculations are reported for methyl branched hydrocarbon molecules in orthorhombic and monoclinic crystalline arrays of linear molecules. The 19 molecules in the array are flexible and twenty methylene units long. Two modes of packing the defect molecule in the crystals are found and for each the mechanical relaxation criterion of there being two or more sites available to the molecule is met. However, there is no significant relaxation strength because the differences in site energies are too large. This results for all cases because the unfavorable orientation of the molecular stem in one of the sites makes the energy too much greater than in the other site which has a favorable orientation. The defect energies show that methyl branches could be incorporated in the crystals in at least one of the cases. For that case, the unit cell dimensions are comparable to those found experimentally for the same methyl group concentration. Drawings showing the molecular distortion are presented.

PB80-103856 Not available NTIS
National Bureau of Standards, Washington, DC.
Temperature Dependence of the Electro-Optic Kerr Coefficient of Nitrobenzene.
Final rept.,
R. E. Hebner, Jr., and M. Misakian. Sep 79, 2p
Pub. in Jnl. of Applied Physics 50, n9, p6016-6017, Sep 79.

The Kerr coefficient of nitrobenzene was measured over the temperature range 285-340 K. To within experimental error, the data indicate that the Kerr coefficient can be expressed as a quadratic function of reciprocal temperature. Fitting the data to this quadratic function yields an equation which can be used to correct the response of a pulse-voltage measuring system based on the Kerr effect for variations in the ambient temperature.

PB80-103872 Not available NTIS
National Bureau of Standards, Washington, DC.
Simulation of the Relaxation of Random-Coil Polymer Chains by Lattice Models with Excluded Volume: The Effect of Bead Movement Rules.
Final rept.,
D. E. Kranbuehl, and P. H. Verdier. 15 Sep 79, 9p
Pub. in Jnl. of Chemical Physics 71, n6, p2662-2670, 15 Sep 79.

Earlier work showed that excluded volume constraints lengthen the long relaxation times of lattice-model polymer chains using single-bead elementary motions by a factor proportional to about the first power of chain length. This paper reports the extension of this work to chains employing double-bead elementary motions and to chains employing random mixtures of both kinds of motion. For pure two-bead motion, the chain-length dependence of the lengthening of relaxation time is essentially identical with that previously obtained for pure single-bead motion. For models using both kinds of move, this chain-length dependence is suppressed at shorter chain lengths. However, for chains longer than about 30 beads, contrary to the prediction of Deutch and others, the lengthening of the relaxation time by excluded volume again becomes proportional to about the first power of chain length. Other studies that have not exhibited this first power dependence have either examined relaxation from highly nonequilibrium configurations or have not employed sufficiently long chains for the effect to be observed.

PB80-104326 Not available NTIS
National Bureau of Standards, Washington, DC.
Laser Initiated Afterglow in a High Pressure K-Kr Mixture.
Final rept.,
L. K. Lam, and L. D. Schearer. 15 Dec 78, 5p
Pub. in Chemical Physics Letters 60, n1, p130-134, 15 Dec 78.

The potassium atoms in a K-Kr mixture ((K) = 6 x 10 to the 14th power/cc : (Kr) = 10 to the 19th power/cc) are ionized with a 140 mu joule, 4 nsec laser pulse in a resonant 2 photon absorption via the K(5p) level. The optical emission spectra in the afterglow of the laser pulse is monitored as a function of time. A fast initial decay of the fluorescence (about 20 nsec) due to collisional excitation of the potassium by the hot photoelectrons and a slow decay tail (about 10 mu sec) due to collisional-radiative recombination is observed.

PB80-104342 Not available NTIS
National Bureau of Standards, Washington, DC.
Coherent Optical Transients Observed by Polarization Switching.
Final rept.,
M. D. Levenson. 15 Jul 79, 4p
Pub in Chemical Physics Letter 64, n3, p495-498, 15 Jul 79.

A transient signal analogous to the optical free induction decay is observed when a laser beam tuned to an absorption line of I2 is switched from left to right circular polarization. The polarization transient amplitude decays at a rate equal to twice the usual transverse decay rate, and can be detected with sensitivity similar to that achieved in polarization spectroscopy.

PB80-104391 Not available NTIS
National Bureau of Standards, Washington, DC.
Effect of Selective Laser Excitation on the Ionization of Atomic Species in Flames.
Final rept.,
J. C. Travis, P. K. Schenck, G. C. Turk, and W. G. Mallard. Aug 79, 5p
Pub. in Analytical Chemistry 51, n9, p1516-1520, Aug 79.

Laser enhanced ionization of atomic species in flames, also known as the optogalvanic effect, has been used as the basis for a new spectrometric technique. A simple model is formulated here to help explain the production of electron-ion pairs by the combination of optical and collisional processes. The model yields an analytical expression for the relative enhanced ionization sensitivity of a given transition of any element, and also predicts possible sources of bias in spectrometric applications. The theoretical function is fitted to experimental data by the least-squares adjustment of two parameters. The fitted function may be used, with appropriate caution, to predict the potential LEI sensitivity of further elements and transitions in a similar flame. The model should provide a durable foundation for the further development of methodology and instrumentation for atomic spectrometry by laser enhanced ionization in flames.

PB80-104516 Not available NTIS
National Bureau of Standards, Washington, DC.
Liquid-Liquid Critical Phenomena.
Final rept.,
S. C. Greer. Nov 78, 6p
Pub. in Accounts of Chemical Research 11, p427-432, Nov 78.

The theories and experiments on liquid-liquid critical phenomena are reviewed and compared. It is found that the experiments confirm the scaling and renormalization group theories.

PB80-104680 Not available NTIS
National Bureau of Standards, Washington, DC.
Ultraviolet Photoemission Studies of Formaldehyde and Related Molecules Adsorbed on Ru(110).
Final rept.,
G. B. Fisher, T. E. Madey, and J. T. Yates, Jr. Apr 78, 5p
Prepared in cooperation with Office of Naval Research, Washington, DC.
Pub. in Jnl. of Vac. Sci. Technol. 15, n2 p543-547, Mar/Apr 78.

The adsorption of formaldehyde (H2CO), hydrogen, and carbon monoxide on Ru(110) has been studied using angle-integrated ultraviolet photoemission spectroscopy (UPS) and temperature programmed desorption (TPD). The UPS spectra for low exposures of H2CO at 80 K indicate that H2CO dissociates to a substantial degree. These spectra are compared with UPS spectra for the sequential adsorption of hydrogen and CO. Whereas there are similarities between these spectra, the differences in the UPS, work function change, and TPD results are sufficient to suggest that a portion of the dissociated H2CO may exist as a surface molecular complex containing H and CO. This is apparently the first reported example, based on a UPS study, of an oxygen-containing organic molecule which dissociates upon adsorption on a metal surface at 80 K. For high exposures at 80 K, adsorption of a condensed layer of molecular H2CO is observed.

SAND-79-0968 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Quantitative Gas Analysis Using Fourier Transform Infrared Spectroscopy.
G. E. Rivord. Jul 79, 27p
Contract EY-76-C-04-0789

Experimental methods have been developed for quantitative trace gas analysis using the Nicolet 7199 Fourier transform infrared (FTIR) spectrophotometer. High resolution (0.06 cm exp -1 full width - half maximum) spectra were obtained for CO and N sub 2 O at approx. 1000, 100, and 5 ppM and CO sub 2 at approx. 1000 ppM. These spectra were used to test the quantitative accuracy of the Beer--Lambert relationship and the linearity of the FTIR system. Two methods were used to analyze the spectra. The first involved the measurement of peak height of the maximum spectral feature of the sample compared to that of a known reference spectrum. The second used a computer-assisted method which correlates all the spectral information from the trace gas sample with that of a high signal-to-noise reference spectrum of the gas. Using the spectral correlation program, which improves the detection limit by a factor of approx. 2, a specified gas can be detected even though its spectral peak heights are less than the noise. A complete description of the spectral correlation method along with the computer program listing is presented. The detection limits for CO, N sub 2 O, and CO sub 2 using the computer program are 2.0, 1.0, and 0.3 ppM, respectively (10 cm gas cell, 35 minute measurement time and 640 Torr). By measuring the volume of gas intercepted by the sample beam, these detection limits correspond to 7.6, 5.2, and 1.9 ng for CO, N sub 2 O, and CO sub 2 respectively. (ERA citation 04:052024)

ZfK-358 PC **A03**/MF **A01**
Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German D.R.).
Positron Annihilation for Investigating Chemical Systems with a View to Electrolyte Solutions.
J. Tutschku. Aug 78, 33p
In German.
U.S. Sales Only.

The possibilities for investigations by positron annihilation are reviewed. Based on the theory of electrolytes the influence of electrolytes in solution is dealt with and a relation is sought between thermodynamic activity and positron annihilation data. The action of activity of diamagnetic ions is relatively small in relation to other influences and a great sensitivity of annihilation data is necessary for the quantitative estimation. (Atomindex citation 10:450546)

7E. Radio and Radiation Chemistry

AD-A075 070/3 Not available NTIS
Purdue Univ Lafayette IN Dept of Chemistry
Photochemistry of Bichromophoric Molecules. Photochemistry and Photophysics of 2-Methylenebenznorbornene and Related Nonconjugated Aryl Olefins in Nonprotic Media.
Frank Scully, Tom Nylund, Fred Palensky, and Harry Morrison. 25 Apr 78, 13p ARO-13088.4-C
Grant DAAG29-76-G-0066
Availability: Pub. in Jnl. of the American Chemical Society, v100 n23 p7352-7364, 8 Nov 78 (No copies furnished by DTIC).

No abstract available.

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

AD-A075 391/3 PC **A02**/MF **A01**
North Carolina Univ at Morehead City Inst of Marine Sciences
International Marine Mycology Symposium (3rd). 9-15 September 1979.
Final rept. 1 Sep 78-31 Dec 79,
Jan J. Kohlmeyer. 28 Sep 79, 8p
Grant N00014-78-G-0063

The Third International Marine Mycology Symposium was held at the University of North Carolina, Institute of Marine Sciences, Sept. 9-15, 1979. Co-sponsor was the National Science Foundation. Sixty participants from 11 countries presented 48 papers and 10 posters. Abstracts of 29 papers have appeared in Botanica Marina 12(6): 403-412, 1979. Topics included ecology, taxonomy, and ultrastructure of higher and lower marine fungi, and their role in the degradation of natural substrates and pollutants. This grant has partly covered travel expenses of seven foreign participants (1-Australia: 2-Federal Republic of Germany; 3-Great Britain; 1-Sweden). (Author)

PB80-106784 PC **A06**/MF **A01**
Marine Mammal Commission, Washington, DC.
Annual Report of the Marine Mammal Commission, Calendar Year 1978; a Report to Congress.
31 Jan 79, 113p MMC-78/01-79
See also report dated 31 Jan 78, PB-281 564.

The report includes a description of the activities and accomplishments of the Commission during the preceding year as well as it's activities for calendar year 1978.

PB80-111602 PC **A04**/MF **A01**
Point Reyes Bird Observatory, Stinson Beach, CA.
Studies of Marine Mammals at the Farallon Islands, California, 1977-1978.
Final rept.,
Harriet R. Huber, David G. Ainley, Stephen H. Morrell, Ronald R. LeValley, and Craig S. Strong. Nov 79, 54p MMC-77/18
Contract MM7AC025

Observations on pinnipeds and cetaceans on or near the South Farallon Islands are reported by the Marine Mammal Commission. Five species of pinnipeds and three of cetaceans were censused and observed from 1 September 1977 to 31 August 1978. These islands provide a unique opportunity for comparative studies of colonization by pinnipeds and of long- and short-term fluctuations in offshore pinniped and cetacean populations of the area.

PB80-111768 PC **A02**
Delaware Univ., Lewes. Coll. of Marine Studies.
The Role of CO2 Enrichment of Aerating Gas in the Growth of an Estuarine Diatom,
Gary D. Pruder, and Ellis T. Bolton. c1979, 18p
DEL/SG-5/79
Pub. in Aquaculture, v17 p1-15 1979.

The effect of carbon dioxide concentration on the growth of Thalassiosira pseudonana (Husted) Hasle and Heimdal clone 3H was studied at three light intensity levels and two oxygen concentrations. Algal cultures were grown in an enriched artificial seawater medium under constant illumination in 500 ml gas wash bottles. Population density, particulate carbon and particulate nitrogen were measured periodically during exponential growth. Growth rate did not increase as the CO2 concentration was elevated above 16.0 micro mole/l. Freshly inoculated algal cultures did not grow in an organic carbon-free medium bubbled with CO2-free air. The kinetics of inorganic carbon mobilization including concentrations, reaction rates, and CO2 transport, generation and uptake are analyzed. (Copyright (c) 1979, Elsevier Scientific Publishing Company.)

PB80-111776 PC **A02**
Mississippi-Alabama Sea Grant Consortium, Ocean Springs, MS.
Analysis of Reproductive Hormones and Plasma Lipid Levels Associated with the Migration of the Stripped Mullet, 'Mugil cephalus L',
John Dindo, Robert MacGregor, and George Crozier. 1978, 23p MASGP-79/007, NOAA-79092703
Grant NOAA-04-7-158-44017
Pub. in ASB Bull., v25 n2 p39 1978. Prepared in cooperation with Alabama Univ. in Birmingham.

Mugil cephalus, a ubiquitous estuarine fish, makes an annual migration to the open sea to spawn. The specimens for this project were caught within the lower and middle reaches of Mobile Bay. Monthly samples of the reproductive steriods (testosterone and estrogens) were analyzed for a one year cycle utilizing a radioimmunoassay technique. Plasma lipid levels were analyzed by use of standard clini-

cal methods utilizing spectrophotometry. Initial analysis shows that male plasma testosterone levels begin a rapid rise from April through August. A peak in reproductive steroids is predicted for November with spawning to occur at the end of December and early January.

PB80-112220 PC **A03**/MF **A01**
Maine Univ., Walpole. Ira C. Darling Center for Research, Teaching and Service.
A Preliminary Bibliography of the Soft Shell Clam, 'Mya arenaria', for the Years 1960-1978,
Les Watling, Barbara Dusty, William Mook, and Jonathan Eaton. 1979, 32p MSG/TR-44/79, NOAA-79092701
Grant NA-79-AA-D-00057

The report is a bibliography of the soft shell clam, Mya arenaria from the Maryland Department of Research and Education, Chesapeake Biological Laboratory, Solomons, Md. The present literature compilation covers the years 1960-1978. The bibliographic citations listed herein were obtained primarily from the following sources: Biological Abstracts, Oceanic Abstracts, Aquatic Sciences and Fisheries Abstracts, and the Zoological Record.

PB80-112915 PC **A02**
California Univ., Bodega Bay. Bodega Marine Lab.
An Evaluation of Three Species of Diatoms as Food for 'Cancer magister' Larvae,
M. C. Hartman, and G. R. Letterman. Jan 78, 11p NOAA-79101506
Grant NOAA-04-6-158-44110
Pub. in Proceedings of the Annual Meeting World Mariculture Society (9th) held at Atlanta, Georgia, on January 3-6, 1978, p271-276 1978.

Diets consisting only of the diatoms Skeletonema costatum, Thalassiosira pseudonana and Phaeodactylum tricornutum were tested on Cancer magister larvae. Each algal species was fed singly and in combination with the others. Unfed controls died after 10 days without molting to the second stage. Those larvae receiving P. tricornutum lived only slightly longer than the starved animals and none reached second stage. S. costatum and T. pseudonana fed singly sustained the larvae 40 and 48 days and allowed development to the third and fourth stages respectively. Survival to 57 days and development into the fifth stage was reached on a diet consisting of a mixture of S. costatum and T. pseudonana. Mixing P. tricornutum with either of the other species did not improve survival beyond those used singly, and mixture of all 3 species was less beneficial than the best 2-part diet.

PB80-112931 PC **A02**
California Univ., Bodega Bay. Bodega Marine Lab.
Artificial Diets for the Lobster, 'Homarus americanus': A revaluation,
E. E. Conklin, M. J. Goldblatt, and C. E. Bordner. cJan 78, 13p NOAA-79101504
Grant NOAA-04-6-158-44110
Pub. in Proceedings of the Annual Meeting World Mariculture Society (9th) held at Atlanta, Georgia, on January 3-6, 1978, p243-250 1978.

The lack of reliable artifical rations is commonly cited as a major impediment in the development of an economically viable aquaculture industry. Research efforts leading to adequate crustacean diets have been especially slow. Recent experiments carried out at the Bodega Marine Laboratory and the University of California at Davis with lobster rations serve to illustrate the problems associated with defining nutritional requirements of crustaceans. Data are presented relating shell erosion in juvenile lobsters to a nutritional deficiency. Results from additional experiments on lobster consumption patterns and on the leaching of water-soluble nutrients are related to this deficiency. The total of these experiments suggests that a revaluation of the current approach to crustecean diet development will be required before further progress can be made.

8C. Dynamic Oceanography

AD-A075 117/2 PC **A03**/MF **A01**
Florida State Univ Tallahassee Dept of Oceanography
Energetics of the Kuroshio South of Japan,
David Szabo , and Georges L. Weatherly. 28 Jul 78, 28p Rept no. 166
Contract N00014-75-C-0201
Pub. in Jnl. of Marine Research, v37 n3 p531-556 1979.

No abstract available.

AD-A075 158/6 PC **A06**/MF **A01**
Tetra Tech Inc Jacksonville Fl
Continental Shelf Circulation Induced by Tidal Jets - An Analytical Study.
Final rept. 1 Jul 78-30 Sep 79,
R. Bruce Taylor , and Prakash B. Joshio. Oct 79, 116p Rept no. TETRAT-3249
Contract N00014-78-C-0693

Results of an analytical investigation of the shelf and nearshore circulation induced by tidal inlets are presented for steady jets issuing into coastal waters having constant depth but arbitrary bottom friction. The surrounding fluid motion is assumed to be steady and potential (i.e., inviscid and irrotational). The effects of unsteadiness, Earth's rotation, and buoyancy have been neglected; however, the important effects of lateral mixing are included. In addition, mathematical formulations are developed to describe steady potential flow with variable bathymetry; and unsteady, inviscid, rotational flow due to Coriolis forces. To obtain the shelf circulation patterns over constant bottom topography, the tidal jet is represented by an equivalent distribution of sinks. The sinks are solutions of Laplace's equations which also governs the potential motion of the jet-induced circulation. The strength of each sink in the distribution is determined by equating the volume flow due to entrainment to the volume flow demanded by the sink, thereby establishing a complete physical and mathematical connection between the jet flow and the outer flow. Analytical expressions are derived for the stream function and velocity components. These quantities are evaluated analytically whenever possible and numerically using Gauss-Legendre quadrature.

AD-A075 405/1 MF **A01**
Meteorology International Inc Monterey Calif
An Analysis System for Fields of Significant Wave Height.
Final rept.,
Bruce R. Mendenhall , Michael J. Cuming , and Manfred M. Holl. Jan 79, 50p Rept no. MII-M-232
Contract N00228-78-D-4316
Availability: Document partially illegible.

A system is described tor the analysis of combined significant wave height using three primary information sources--in-situ observations, satellite-derived data, and the output generated by a spectral wave model. Examples are given together with field verification statistics. Methods for adjusting the SOWM spectrum fo conform to analyzed values of significant wave height are discussed. (Author)

N79-33779/6 PC **A08**/MF **A01**
Mississippi State Univ., Mississippi State. Dept. of Geology and Geography.
Beach Erosion Control Study at Pass Christian.
31 Dec 78, 173p NASA-CR-162349
Contract NGL-25-001-054

The methods of measuring the existence of erosion and the effects of sand stabilization control systems are described. The mechanics of sand movement, the nature of sand erosion, and the use of satellite data to measure these factors and their surrogates are discussed using the locational and control aspects of aeolian and litoral erosion zones along the sand beach of the Mississippi coast. The aeolian erosion is highlighted due to the redeposition of the sand which causes high cleanup costs, property damage, and safety and health hazards. The areas of differential erosion and the patterns of beach sand movement are illustrated and the use of remote sensing methods to identify the areas of erosion are evaluated.

8E. Geodesy

N79-32778/9 PC **A04**/MF **A01**
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Numerical Solution to the Inverse Problem of the Geodetic Ellipsoid of Revolution die Numerische Loesung der Zweiten Geodaetischen Hauptaufgabe Auf Dem Rotationsellipsoid.
D. Ehlert. 1978, 59p SER-B-228-MITT-145
In German; English Summary.

In conjunction with new developments in procedures for determining positions on the earth's surface and for navigation, the inverse problem is treated theoretically. Computer programs are presented that enable short, medium-long, and long geodesics to be determined. The corresponding source programs and reference lists are given in each case. A differential formulaic representation is then developed for geodesic lines.

N79-33675/6 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Angular Dislocation of the Earth Principal Axes of Inertia.
W. C. C. Silva, H. U. Pilchowski, and L. D. D. Ferreira. Jul 79, 16p INPE-1508-RPE/048
Misc-Revised.

The expression of geopotential in spherical harmonics (potential of Terrestrial Gravitational field) has two coefficients C sub 21 and S sub 21 which are taken as zero in theory (e.g., the axis of earth rotation was used as the principal axis of inertia). However, satellite measurements show that C sub 21 as well as S sub 21 are nonzero, indicating that the axis of rotation of the earth is not the principal axis of inertia. The angles by which the principal axes of inertia must be rotated in relation to the geocentric coordinate system (where the Z axis coincides with the rotating axis of the earth), the error due to using C sub 21 = S sub 21 = O, and the effect of such error in the other coefficients of the geopotential are examined.

8F. Geography

N79-32622/9 PC **A06**/MF **A01**
Food and Agriculture Organization of the United Nations, Rome (Italy). Remote Sensing Unit
Advanced Training and Research on Satellite Remote Sensing Techniques and Applications in the United Kingdom and the United States, 1 October 1977 to 30 September 1978.
Final Report.
J. U. Hielkema. 1978, 113p AGLT/RSU-Ser-2/79
Misc-Original Contains Color Illustrations.

Universities and scientific research centers were visited in the U.K. and the United States in order to study different types of satellite remote sensing data for a variety of applications. The development of specific digital data processing and classification techniques for detection, quantifying, and monitoring of desert vegetation using LANDSAT multispectral data was emphasized. It is noted that research and development efforts in the field of satellite remote sensing has become more and more oriented towards computer assisted techniques for data handling, analysis, and interpretation of both environmental and earth resources satellite data. Visual photointerpretation is seen as outmoded and investment in hardware, software, and trained manpower to optimize the use of available data is strongly advised.

N79-33516/2 PC **A13**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
Catalog of Earth Photographs from the APOLLO-Soyuz Test Project.
F. El-baz. Sep 79, 295p NASA-TM-58218, JSC-14904

Information is given on earth photographs obtained by the Apollo astronauts during the Apollo Soyuz Test Project. The data are arranged in three sections. A map index shows the boundaries of each photograph and is used for a quick survey of the coverage for a given geographical area. A tabular index provides the following data: list of photographs by serial number, description of geographic location, latitude and longitude of the center point of the photograph, date when photograph was taken, ground elapsed time, revolution number of Apollo spacecraft, approximate spacecraft altitude, tilt, sun angle, camera, and lens. The photo-

graphic index provides same size black and white prints made from the original color negatives.

N79-33530/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Effects of Vegetation Canopy Structure on Remotely Sensed Canopy Temperatures.
D. S. Kimes. Jul 79, 20p NASA-TM-80331

The effects of vegetation canopy structure on thermal infrared sensor response must be understood before vegetation surface temperatures of canopies with low percent ground cover can be accurately inferred. The response of a sensor is a function of vegetation geometric structure, the vertical surface temperature distribution of the canopy components, and sensor view angle. Large deviations between the nadir sensor effective radiant temperature (ERT) and vegetation ERT for a soybean canopy were observed throughout the growing season. The nadir sensor ERT of a soybean canopy with 35 percent ground cover deviated from the vegetation ERT by as much as 11 C during the mid-day. These deviations were quantitatively explained as a function of canopy structure and soil temperature. Remote sensing techniques which determine the vegetation canopy temperature(s) from the sensor response need to be studied.

8G. Geology and Mineralogy

AD-A075 113/1 Not available NTIS
Massachusetts Inst of Tech Cambridge Dept of Earth and Planetary Sciences
Seismic Velocities of Lewisian Metamorphic Rocks at Pressures to 8 kbar: Relationship to Crustal Layering in North Britain,
Jeremy Hall , and Gene Simmons. 4 Dec 78, 11p
Contract N00014-76-C-0478
Availability: Pub. in the Geophysical Jnl. of the Royal Astronomical Society, v58 p337-347 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 118/0 PC **A03**/MF **A01**
Lamont-Doherty Geological Observatory Palisades N Y
Deep Thermohaline Flow and Current-Controlled Sedimentation in the Amirante Passage: Western Indian Ocean.
Journal article,
David A. Johnson , and John E. Damuth. 31 Jul 78, 44p Rept no. LDGO-2857
Contract N00014-75-C-0210
Pub. in Marine Geology, v33 p1-44 1979. Prepared in cooperation with Woods Hole Oceanographic Institution, MA., Rept. no. WHOI-CONTRIB-4206.

No abstract available.

DOE/ER-0030 PC **A04**/MF **A01**
Department of Energy, Washington, DC. Office of Basic Energy Sciences.
Summaries of Physical Research in the Geosciences.
Aug 79, 63p

The Department of Energy supports research in the geosciences in order to provide a sound basis of fundamental knowledge in those areas of the earth, atmospheric, and solar/terrestrial sciences which relate to DOE's many missions. The summaries in this document, prepared by the investigators, describe the work performed during 1978, include the scope of the work to be performed in 1979 and provide information regarding some of the research planned for 1980. The following is an outline of the research areas included: geology, geophysics, and earch dynamics (large-scale earth movements; evolution of geologic structures; properties of earth materials; rock flow, fracture, and failure; continental drilling for scientific purposes); geochemistry (geothermal fluids; static rock--water interactions; organic geochemistry; geochemical migration); energy resource recognition, evaluation, and utilization (resource definition and utilization; reservoir dynamics and modeling; magma energy resources; information compilation, evaluation, and dissemination); hydrologic and marine sciences (ground water hydrology; fresh water systems; oceanography); and solar--terrestrial/atmospheric interactions (magnetospheric physics and chemistry; upper atmosphere chemistry and physics; solar radiation; meteorology and climatology). (ERA citation 04:052241)

LA-7923-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Uranium, Thorium, and Lead Concentrations and Lead Isotopic Composition of Biotite Granodiorite (Sample 9527-2B) from LASL Drill Hole GT-2.
R. E. Zartman. Jul 79, 20p
Contract W-7405-ENG-36

An investigation of the uranium (U), thorium (Th), and lead (Pb) isotopic systematics was made on the whole rock, microcline, plagioclase, biotite, sphene, zircon, epidote, and pyrite of a biotite granodiorite (core sample 9527-2b) obtained from a depth of almost 3 km in Los Alamos Scientific Laboratory's (LASL) deep drill hole GT-2. Except for quartz, magnetite, and apatite, all primary mineral phases were analyzed, as were epidote and pyrite from minute epidote--calcite--pyrite veinlets formed during a later fracture filling event. The sphene and zircon data offer strong support for an initial crystallization age of about 1500 +- 20 m.y for the biotite granodiorite. Likewise, a model age of about 1500 m.y. is calculated for the microcline. This amount of time is also required for the whole rock to evolve essentially as a closed system from an initial lead isotopic composition similar to that of the microcline. The plagioclase and biotite, on the other hand, clearly record isotopic disturbance at some time(s) subsequent to the crystallization of the rock. The isotopic systematics of the secondary epidote and pyrite do not allow for a unique determination of the age of the fracture-filling event, but suggest a more complex history of chemical migration extending perhaps from Precambrian to Phanerozoic time. (ERA citation 04:051406)

N79-33683/0 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Proposed Satellite Laser Ranging and Very Long Baseline Interferometry Sites for Crustal Dynamics Investigations.
P. D. Lowman, R. J. Allenby, and H. V. Frey. Sep 79, 71p NASA-TM-80563, REPT-922

Recommendations are presented for a global network of 125 sites for geodetic measurements by satellite laser ranging and very long baseline interferometry. The sites were proposed on the basis of existing facilities and scientific value for investigation of crustal dynamics as related to earthquake hazards. Tectonic problems are discussed for North America peripheral regions and for the world. The sites are presented in tables and maps, with bibliographic references.

N79-33685/5 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Multivariate Approximation Methods and Applications to Geophysics and Geodesy.
M. J. Munteanu. Aug 79, 40p NASA-TM-79679
Subm-Submitted for Publication.

The first report in a series is presented which is intended to be written by the author with the purpose of treating a class of approximation methods of functions in one and several variables and ways of applying them to geophysics and geodesy. The first report is divided in three parts and is devoted to the presentation of the mathematical theory and formulas. Various optimal ways of representing functions in one and several variables and the associated error when information is had about the function such as satellite data of different kinds are discussed. The framework chosen is Hilbert spaces. Experiments were performed on satellite altimeter data and on satellite to satellite tracking data.

PB80-106875 PC **A17**/MF **A01**
Weston Observatory, MA.
The Coal-Bearing Narragansett Basin of Massachusetts and Rhode Island. Volume 1: Geology,
James W. Skehan, and Daniel P. Murray. 1978, 391p NSF/RA-780329
Grant NSF-AER76-02147
See also Volume 2, PB80-106883.

The geological aspects of coals in the 950 square mile Narragansett Basin of southeastern New England are discussed. The Basin is a structural depression and topographic lowland containing sequences of coal-bearing strata of Pennsylvania age. As a result of the 1973 energy crisis, a program was designed to evaluate potential coal deposits. This report summarizes the progress of this program through the spring of 1978 and covers the results of drilling and related activities. Materials for the study were obtained from an NX core of approximately 14,000 linear feet from 18 deep and 6 shallow holes. Conclusions resulting from the study on coal quality, geological characteristics, geophysics, and past and present uses of the coal are presented in a summary. A major portion of this volume consists of appendices containing a bibliography and research reports of the Narragansett Basin.

SAND-78-1827C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
K/Sub Ic/ and J-Resistance Curve Measurements on Nevada Tuff.
R. Weisinger, L. S. Costin, and T. J. Lutz. 1979, 18p CONF-790503-1
Contract EY-76-C-04-0789
Spring meeting of society for experimental stress analysis, San Francisco, CA, USA, 20 May 1979.

Linear elastic fracture mechanics and J-integral test methods were used to determine the static fracture behavior of a porous volcanic tuff. Notched and prefatigued specimens of two different sizes were tested in three-point bending. The fracture toughness (K/sub Ic/) and the J-resistance (J versus crack growth) curve for each specimen were determined. The results indicate that there is good agreement between the fracture parameters determined by the two methods; however, there is some dependence of the results on specimen size. Possible reasons for this specimen size dependence are discussed. 4 figures. (ERA citation 04:037622)

SAND-79-0975 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Average Structure of the Upper Earth Mantle and Crust Between Albuquerque and the Nevada Test Site.
H. D. Garbin. Aug 79, 25p
Contract EY-76-C-04-0789

Models of Earth structures were constructed by inverting seismic data obtained from nuclear events with a 1600-m-long laser strain meter. With these models the general structure of the earth's upper mantle and crust between Albuquerque and the Nevada Test Site was determined. 3 figures, 3 tables. (ERA citation 04:052247)

8H. Hydrology and Limnology

AD-A075 139/6 PC **A03**/MF **A01**
Geological Survey Tacoma Wa Water Resources Div
Sediment Transport by the White River into Mud Mountain Reservoir, Washington, June 1974-June 1976.
Water-resources investigations,
Leonard M. Nelson. Jun 79, 32p Rept nos. USGS/WRD/WRI-79-071, USGS/WRI-78-133

This reconnaissance evaluation of the sediment transported by the White River into Mud Mountain Reservoir during the period June 1974-June 1976 showed that the river transported 430,000 tons of suspended sediment into the reservoir during the first year of the study and 1,400,000 tons during the second year. Daily mean suspended-sediment concentrations generally were less than 500 milligrams per liter; the highest recorded was 6,200 milligrams per liter, on December 1, 1975. A good relation exists between daily suspended-sediment discharge and mean daily water discharge, although no clear trend exists during period of glacial melt-water discharges. Data from samples obtained by use of the Helley-Smith bedload sampler indicate that the bedload measured using the sampler is about 4 percent of the suspended-sediment discharge. The potential deposition was 750 acre-feet during the period of the study. (Author)

AD-A075 141/2 PC **A03/MF A01**
Geological Survey Tallahassee Fla Water Resources Div
Estimated Drawdowns in the Floridan Aquifer due to Increased Withdrawals, Duval County, Florida.
Water resources investigations,
Bernard J. Franks , and Gertrude G. Phelps. Jul 79, 29p Rept nos. USGS/WRD/WRI-79/069, USGS/WRI-79-84

A simplified model of the Floridan aquifer system underlying Duval County consists of two highly permeable water-bearing zones separated by a semiconfining zone of relatively low permeability, all of which are confined above and below by much less permeable strata. At present (1979) only the upper permeable zone is tapped by production wells. Decreases in artesian pressure in the upper permeable zone of the aquifers induce upward leakage of water from the lower permeable zone resulting in reduced pressure in this zone. Thus, saline water from deeper strata can move upward, apparently along fractures and faults into the lower permeable zone.

PB80-108590 PC **A03/MF A01**
Massachusetts Univ., Amherst. Water Resources Research Center.
The Relationship Between Water Depth and Sedimentary Pigment Concentration in Two Holomictic Berkshire Lakes,
Stuart D. Ludlam. Jun 79, 39p PUB-105, W80-00871, OWRT-A-109-MASS(1)
Contract DI-14-34-0001-8023

The concentration of chlorophyll derivatives and total carotenoids in the sediment of lakes studied to date is directly related to the depth of water overlying the sediment. This relationship is roughly linear until relatively deep water is reached where there is a tendency for sedimentary pigment concentration to increase more slowly or remain relatively stable with further increases in water depth. In each of two holomictic lakes, pigment profiles taken from all water depths below and including the littoriprofundal zone were similar in their major features, despite the influence of water depth on overall pigment concentration. The relationship between water depth and sedimentary pigment concentration is probably indirect. Although several explanations are possible it seems most probable that water depth controls turbulence and hence resuspension of the sediment.

8I. Mining Engineering

AD-A075 536/3 PC **A05/MF A01**
National Research Council Washington Dc Panel on Best Available and Safest Technologies
Implementing Best Available and Safest Technologies for Offshore Oil and Gas.
1979, 76p
Contract N00014-76-C-0309

The government needs to determine an acceptable level of risk for offshore operations that is consistent with national policy. For the purpose of its work, the panel assumed that the acceptable level of risk for offshore operations is zero accidents, zero deaths, and zero oil spills--though this goal may not be attainable. The panel realizes that neither the law nor any government regulation can prevent all possible accidents or malfunctions in complex systems such as offshore oil and gas production facilities. While it is an incontrovertible fact that offshore oil and gas production equipment has earned a remarkable record for safety in the past 25 years, human performance has often been attributed as a cause of failures and mishaps. The BAST requirement is limited to technologies on the OCS and is not designed to mitigate human errors. This leads to the second issue, which is the problem of calculating incremental benefits and costs related to obtaining a desired level of risk. These problems are discussed in detail in the report.

FE-2468-38 PC **A04/MF A01**
Engineering Societies Commission on Energy, Inc., Washington, DC.
Review of the Borehole Hydraulic Coal Mining System. Final Report on Task OII.
T. A. Boyce. Dec 78, 56p
Contract EF-77-C-01-2468

As part of a coal mining R and D review task being undertaken by the Engineering Societies Commission on Energy, Inc., for the Department of Energy Fossil Energy Program, the borehole hydraulic mining system was selected for review. The borehole hydraulic coal mining system accesses the coal seam through a hole drilled in the overburden. The mining device is lowered through the hole into the coal seam where it fragments the coal with high-pressure water jets. The fragmented coal is pumped to the surface as a slurry by a jet pump located in the center of the mining device. The coal slurry is then injected into a slurry pipeline for transport to the preparation plant. The study included a technical assessment, an economic assessment, a comparison with other methods, and a review of regional applicability. Nominal cases for applications of the borehole method in both horizontal and near-vertical seams were analyzed. The borehole mining system results in recovery of approximately 45% of the coal in place. In horizontal seams, strip mining offers considerably lower cost for the same ratio of overburden to coal. In pitching seams, the scarcity of thick vertical seams limits the geographic applicability of the borehole method. (ERA citation 04:051077)

FE-2475-22 PC **A07/MF A01**
Kennedy Van Saun Corp., Danville, PA.
Developing/Modifying Coal Grinding Procedures and Equipment to Produce Predictable Size Distributions During Coal Preparation. Quarterly Progress Report, April--June 1978.
P. T. Luckie. 15 Jul 78, 145p
Contract EX-76-C-01-2475

The work centered on completing the final version of a paper which summarizes the coal in oil grinding, the development of the mathematical models to describe the size reduction devices and the completion of the mechanical property testing of the project coals. Benchmark tests on the air swept hammer mill were conducted. This system was found to be very sensitive to operating load. The hammer mill rpm is now being increased. Benchmark tests on the wet grinding system were started with emphasis on the effect of weight percent solids. Special tests to facilitate the mathematical model development of the air swept ball mill and ball and race mill were conducted. (ERA citation 04:051082)

IS-4655 PC **A06/MF A01**
Ames Lab., IA.
Fossil Energy Program. Technical Progress Report, October 1--December 31, 1978. I. Mining Research and Development-Coal Preparation and Analysis. II. Advanced Research and Technology Development.
May 79, 112p
Contract W-7405-ENG-82

This report covers objectives and progress for eight areas of the Ames Laboratory Fossil Energy Program. Separate sections were abstracted and indexed individually. (ERA citation 04:050931)

NVO-1558-4(V.1) PC **A06/MF A01**
Gruy Federal, Inc., Houston, TX.
Atlantic Coastal Plain Geothermal Test Holes, Virginia: Hole Completion Reports.
L. B. Cobb, L. Radford, and M. Glascock. Mar 79, 110p
Contract ET-78-C-08-1558

A description of the Atlantic Coastal Plain Geothermal Drilling Program and data for the following geothermal test holes drilled in Virginia are summarized in this report: NASA/Wallops Island, Isle of Wight, Suffolk, Oceana naval Air Station, and Cheriton. (ERA citation 04:051357)

NVO-1558-4(V.2) PC **A06/MF A01**
Gruy Federal, Inc., Houston, TX.
Atlantic Coastal Plain Geothermal Test Holes, Virginia: Hole Completion Reports.
L. B. Cobb, L. Radford, and M. Glascock. Mar 79, 114p
Contract ET-78-C-08-1558

A description of the Atlantic Coastal Plain Geothermal Drilling Program and data for the following geothermal test holes drilled in Virginia are summarized: Creeds, Norfolk Naval Base, Langley Air Force Base, Wattsville, Withams, and Atlantic. (ERA citation 04:051358)

NVO-1558-4(V.3) PC **A05/MF A01**
Gruy Federal, Inc., Houston, TX.
Atlantic Coastal Plain Geothermal Test Holes, Virginia: Hole Completion Reports.
L. B. Cobb, L. Radford, and M. Glascock. Mar 79, 96p
Contract ET-78-C-08-1558

A description of the Atlantic Coastal Plain Geothermal Drilling program and data for the following geothermal test holes drilled in Virginia are summarized: Accomac, Eastville, Hampton, Smith Point, and Suffolk. (ERA citation 04:051359)

ORO-5302-30 PC **A03/MF A01**
Columbia Gas Transmission Corp., Charleston, WV.
Tertiary Oil Recovery by CO sub 2 Injection. Quarterly Report, April--June 1978.
W. D. Conner. Sep 78, 29p
Contract EF-76-C-05-5302

Total water injection for the quarter was 17,370, an increase of approximately 2700 barrels over the previous period. The increase was due to remedial work on the input wells that was completed during March. The only problems occurred during June, when excessive shutdowns resulted from line plugging after moving the water tanks. This problem was subsequently solved. Oil production for the period was 4314 barrels, an increase of approximately 660 barrels over the previous quarter. Although increases in production were experienced in wells outside the pattern, the central producer continued at about 1 barrel per day with increasing water production. Total production attributable to CO sub 2 injection is 8562 barrels. (ERA citation 04:051102)

ORO-8215-1 PC **A04/MF A01**
Kentucky Geological Survey, Henderson.
Studies of New Albany Shale in Western Kentucky. Final Report, December 1, 1977--November 30, 1978.
H. R. Schwalb, and R. L. Norris. 1978, 69p
Contract EW-78-S-21-8215

The New Albany (Upper Devonian) Shale in western Kentucky can be zoned by using correlative characteristics distinguishable on wire-line logs. Wells drilled through the shale which were logged by various methods provided a basis for zonation of the subsurface members and units of the Grassy Creek, Sweetland Creek, and Blocher. Structure and isopach maps and cross sections were prepared. The Hannibal Shale and Rockford Limestone were found in limited areas; isopach maps were not made for these members. Samples of cuttings from selected wells were studied in order to identify the contact of the shale with underlying and overlying rock units. A well-site examination of cuttings through the shale section was conducted, and the presence of natural gas was observed in the field. The New Albany Shale has the potential for additional commercially marketable natural gas production. Exploratory drilling is needed to evaluate the reservoir characteristics of the New Albany Shale. (ERA citation 04:051120)

PB80-106347 PC **A09/MF A01**
SRI International, Menlo Park, CA.
A Computer-Based Consultant for Mineral Exploration.
Final rept.,
Richard O. Duda, Peter E. Hart, Kurt Konolige, and Rene Reboh. Sep 79, 191p NSF/RA-790228
Grant NSF-AER77-04499

This report summarizes the results of a two-year program of research on the Prospector system--a set of computer programs to provide consultation services for mineral exploration. The heart of the system is a group of specially encoded models of different classes of ore deposits. Such models can be used for several purposes, including evaluation of a particular exploration site, evaluation of drilling targets within that site, regional resource evaluation, and informal education about each class of deposits modeled. Eight prospect-scale models, two drilling-scale models, and one regional-scale model have been developed, and their current

status is summarized. Detailed technical accomplishments during the past six months are described in appendices on a particular ore deposit model, the control strategy for the program, a new method for probabilistic computations, and a new knowledge acquisition system.

PB80-106883 PC **A22**/MF **A01**
Weston Observatory, MA.
The Coal-Bearing Narragansett Basin of Massachusetts and Rhode Island. Volume 2: Legal, Economic, Environmental, and Societal Study (LEES).
Final rept.,
Theodore H. Rider. 1978, 513p NSF/RA-780180
Grant NSF-AER76-02147
See also Volume 1, PB80-106875.

This report consists of analyses in four areas of nongeological concern: legal, economic, environmental, and societal. The purpose of this volume is to identify institutional barriers which might arise as a result of developing interests in reserve extraction in the Narragansett Basin. Approximately thirty pieces of legislation are analyzed and related to economic, environmental, and societal aspects of mining activity.

PB80-110885 PC **A03**/MF **A01**
Bureau of Mines, Washington, DC.
Molybdenum,
John T. Kummer. May 79, 30p
Report on Mineral Commodity Profiles.

Molybdenum is a refractory metallic element used principally as an alloying agent in steels, cast irons, and superalloys to enhance hardenability strength, toughness, and wear and corrosion resistance. Primarily added in the form of molybdic oxide or ferromolybdenum, it is frequently used in combination with chromium, columbium, manganese, nickel, tungsten, or other alloy metals to achieve desired metallurgical properties. The report presents comprehensive data on molybdenum including industry structure, uses, reserves-resources, technology, supply-demand relationships, byproducts and coproducts, strategic considerations, economic factors and problems, operating factors and problems, and outlook to 2000.

PB80-110984 PC **A04**/MF **A01**
General Accounting Office, Washington, DC. Energy and Minerals Div.
Interior Lacks Adequate Oversight of Shut-In or Flaring Natural Gas Wells on the Outer Continental Shelf.
Report to the Congress.
21 Nov 79, 52p EMD-80-3

This report, mandated by the Outer Continental Shelf Lands Act Amendments of 1978, describes the Department of the Interior's methodology used to allow Outer Continental Shelf wells to be shut-in or to flare natural gas, and suggests ways to improve this Departmental function.

PB80-111362 PC **A02**/MF **A01**
Bureau of Mines, Washington, DC.
Perlite,
Arthur C. Meisinger. Aug 79, 20p
Report on Mineral Commodity Profiles.

Perlite, a glossy volcanic rock, has the unusual characteristic of expanding to about 20 times its original volume when heated to an appropriate temperature within its softening range. The resultant expanded product finds a variety of industrial and constructional applications owing to the material's low density with attendant properties of low thermal conductivity and high sound absorption. The United States is the world's principal producer and consumer of perlite. The report presents comprehensive data on perlite including industry structure, uses, reserves-resources, technology, supply-demand relationships, economic factors, and problems, operating factors and problems, and outlook to 2000.

PB80-111404 PC **A05**/MF **A01**
Bureau of Mines, Washington, DC.
Mineral Industries of Canada, Australia, and Oceania.
Mineral perspectives,
Walter C. Woodmansee, and Charlie Wyche. Jul 79, 77p
Report on Mineral Perspectives.

The report presents a summary review of the mineral industries of 10 widely separated mineral-producing nations. In addition to Canada and Australia, this review encompasses eight Pacific Island nations or territories--New Zealand, New Caledonia, Papua New Guinea, Fiji Islands, New Hebrides, Solomon Islands, Nauru, and Ocean Island. Maps, photographs, and summary textual outlines are included. Coverage for Canada is by Province and Territory, and for Australia by State and Territory, in addition to overall national reviews. The maps show locations of mines or mining areas, oil and gas fields, and plant facilities, including nonferrous smelters and refineries, iron and steel works, cement plants, and oil refineries. The summary texts indicate the major metals and minerals produced, the significance of the nation as a mineral supplier, and the principal mining companies; they also give other information relating to the mineral industries.

PB80-111420 PC **A02**/MF **A01**
Bureau of Mines, Washington, DC.
Cadmium,
John M. Lucas. Aug 79, 20p
Report on Mineral Commodity Profiles.

Cadmium is a relatively rare element used in its metallic form for plating and alloying. Cadmium compounds find a wider use in pigments, plastics, and batteries. The United States is the world's largest consumer of cadmium. The report presents comprehensive data on cadmium including industry structure, uses, reserves-resources, technology, supply-demand relationships, strategic considerations, economic factors and problems, environmental considerations--toxicity, operating factors and problems, and outlook to 2000.

PB80-111438 PC **A02**/MF **A01**
Bureau of Mines, Washington, DC.
Bismuth,
James F. Carlin. Aug 79, 17p
Report on Mineral Commodity Profiles.

Bismuth metal is produced primarily as a byproduct from the ores of other metals, principally copper and lead. The principal uses of bismuth are in pharmaceuticals and industrial chemicals, and uses that depend upon the ability of bismuth to impart fusibility and machinability to a variety of alloys. The report presents comprehensive data on bismuth including industry structure, uses, reserves-resources, technology, supply-demand relationships, byproducts and coproducts, strategic considerations, economic factors and problems, operating factors and problems, and outlook to 2000.

PB80-112683 PC **A04**/MF **A01**
Bureau of Mines, Twin Cities, MN. Twin Cities Mining Research Center.
Quarrying Near Urban Areas: An Aid to Premine Planning.
Information circular.,
J. M. Pugliese, D. E. Swanson, W. H. Engelmann, and T. R. Bur. 1979, 57p BUMINES/IC-8804

The Bureau of Mines, in support of its overall goal of helping to meet future U.S. demand for minerals, undertook this study to aid the quarry entrepreneur and/or operator in developing quarries near urban areas. In response to increased environmental concerns, the quarry operator often must take steps beyond those required in the last decade toward gaining permits for quarrying near metropolitan areas. Following the steps suggested in this report should increase the chances to obtain the permits to open and develop a quarry. Each task and question in the general plan flow diagrams are described in detail, with the flow diagrams aimed at the goal of acquiring the necessary permits. The appendixes include (1) types of projects for which Environmental Impact Statements (EIS's) may be prepared and Federal agencies responsible for preparing them, (2) State contacts for information regarding environmental impact assessment requirements and mining and mineral land reclamation laws, (3) a checklist of environmental inventory factors, (4) a tabulation of different regulations that affect mining in Michigan and the number of townships and counties that have each of the listed regulations, and (5) environmental logic associated with site selection. A central recommendation is that the quarry entrepreneur and/or operator coordinate plans at the beginning with local government officials (such as township supervisors and/or city and county planning board members), State and Federal officials, and public groups that will be affected.

PB80-113202 PC **A05**/MF **A01**
General Accounting Office, Washington, DC. Energy and Minerals Div.
Phosphates: A Case Study of a Valuable, Depleting Mineral in America.
Report to the Congress.
30 Nov 79, 85p EMD-80/21

The report discusses the many problems and long leadtimes involved in phosphate development in the United States, world's largest producer of phosphates. Phosphate rock is the only known practical source of phosphorus, crucial to fertilizer used in agriculture. GAO recommends that the highest levels of Government begin promptly an assessment of access impediments to phosphate minerals and review of the Nation's long-range phosphate position regarding future availability, including legislative changes as may be needed to ensure supply.

SAN-1395-26 PC **A03**/MF **A01**
Long Beach, CA.
Pilot Demonstration of Enhanced Oil Recovery by Micellar Polymer Waterflooding, Phase B. Quarterly Report, Third Quarter 1978.
H. L. Staub. 10 Oct 78, 28p
Contract EF-77-C-03-1395

Petroleum sulfonate for the Wilmington Micellar-Polymer project in California is under order. The schedule for initiation of micellar slug injection has been delayed until about mid-November. The slug optimization phase must be repeated. Production and injection has been initiated in all wells within the project area; performance is satisfactory. (ERA citation 04:051103)

SAND-79-0013C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Technology Development for High Temperature Logging Tools.
A. F. Veneruso, and J. A. Coquat. 1979, 7p
CONF-790605-2
Contract EY-76-C-04-0789
20. annual logging symposium, Tulsa, OK, USA, 3 Jun 1979.

A set of prototype, high temperature logging tools (temperature, pressure and flow) were tested successfully to temperatures up to 275 exp 0 C in a Union geothermal well during November 1978 as part of the Geothermal Logging Instrumentation Development Program. This program is being conducted by Sandia Laboratories for the Department of Energy's Division of Geothermal Energy. The progress and plans of this industry based program to develop and apply the high temperature instrumentation technology needed to make reliable geothermal borehole measurements are described. Specifically, this program is upgrading existing sondes for improved high temperature performance, as well as applying new materials (elastomers, polymers, metals and ceramics) and developing component technology such as high temperature cables, cableheads and electronics to make borehole measurements such as formation temperature, flow rate, high resolution pressure and fracture mapping. In order to satisfy critical existing needs, the near term goal is for operation up to 275 exp 0 C and 7000 psi by the end of FY80. The long term goal is for operation up to 350 exp 0 C and 20,000 psi by the end of FY84. (ERA citation 04:038527)

TID-28943 PC **A14**/MF **A01**
Occidental Oil Shale, Inc., Grand Junction, CO.
Occidental Vertical Modified In Situ Process for the Recovery of Oil from Oil Shale, Phase 1. Quarterly Progress Report, May 1--July 31, 1978.
R. A. Loucks. Aug 78, 308p
Contract EY-77-A-04-3873

Work at Logan Wash during May, June, and July involved post-rubblization construction of Retort 6, flow and tracer testing of the retort, and running a

small scale start-up field test to verify the start-up procedure proposed for Retort 6. Ignition is planned for late August 1978. At the C-b tract, the shaft collaring for the production, service and ventilation/escape shafts, the consolidation grouting around the service and production shafts, and excavation of the vertical segment of the service shaft air inlet were completed. Various building and concrete batch plant construction activities continued. (ERA citation 04:051133)

TID-29381 PC **A06**/MF **A01**
Colorado State Univ., Fort Collins. Engineering Research Center.
Simultaneous Measurement of the Thermal and Electrical Conductivity of Green River Oil Shale. Final Report, June 2, 1976–August 30, 1977.
J. DuBow. 1978, 102p
Contract ET-78-S-03-1748

Goal was to investigate the thermal environmental effects of in-situ retorting operations. Conclusion is that the insulating nature of the shale and the surrounding country rock are such as to make the thermal pollution due to in-situ retorting an insignificant environmental hazard. An estimate of minimum pillar thickness for pillar temperatures below 250 exp 0 C can be made from the calculations. Thermal conductivity of Green River oil shale decreases with temperature, and 30% anisotropy exists parallel and perpendicular to the sedimentary varve lines. 31 figures, 3 tables. (ERA citation 04:051134)

UCRL-52496(V.6) PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Environmental Overview of Geothermal Development: The Geysers-Calistoga KGRA. Volume 6. Water Quality.
K. D. Pimentel. 11 Oct 78, 54p
Contract W-7405-ENG-48

This report identifies key issues, assesses available information, and recommends research related to water quality degradation resulting from geothermal development in The Geysers-Calistoga Known Geothermal Resource Area. Data necessary for making decisions to minimize damage while allowing development is lacking in three areas: For the whole KGRA, there is insufficient information on the relation of industry-related construction to erosion, with its resulting increase in sediment and silt in area streams. The effects of cooling tower drift on soils and vegetation near power plants should be studied as precursors of potential effects on water quality. For the hot-water resource area in the eastern portion of the KGRA, a long-range program of water quality monitoring is needed to establish a baseline. (ERA citation 04:051369)

8J. Physical Oceanography

AD-A075 102/4 PC **A02**/MF **A01**
Naval Postgraduate School Monterey Ca
Temperature Fine Structure Near the Sea-Ice Margin of the Chukchi Sea.
Interim rept. 1 Oct 78-30 Sep 79,
Robert G. Paquette , and Robert H. Bourke. 12 May 79, 20p Rept no. NPS-68-79-004
Pub. in Jnl. of Geophysical Research, v84 nC3 p1155-1164, 20 Mar 79.

No abstract available.

AD-A075 212/1 PC **A03**/MF **A01**
Naval Postgraduate School Monterey Ca
One-Dimensional Model Predictions of Ocean Temperature Anomalies during Fall, 1976.
Technical rept. Dec 78-Aug 79,
Russell L. Elsberry , Patrick C. Gallacher , and Roland W. Garwood, Jr. Aug 79, 30p Rept no. NPS63-79-003

The hypothesis that upper Ocean temperature anomalies that developed over the North Pacific Ocean during the fall-winter of 1976-77 were primarily generated by vertical mixing processes was tested using the Garwood (1977) mixed layer model. A series of points along 175 deg W and along 38 deg N were chosen for use in this preliminary study. Atmospheric forcing for the one-dimensional ocean model was derived from the surface heat budget calculations in the Fleet Numerical Weather Central (FNWC) atmospheric prediction model. The suitability of the FNWC heat flux calculations was evaluated through comparison with the upper ocean heat content changes derived from the TRANSPAC analyses. The comparisons showed better agreement along 175 deg W than along 38 deg N. A series of ocean thermal structure predictions from 15 September to 31 December 1976 were made using the time series of the atmospheric forcing and the initial profile from the September TRANSPAC analysis. In the central region near 38 deg N, 165 deg W the predicted thermal structure agreed very well with the TRANSPAC analysis for December 1976. Near the southern and western ends of the domain, the temperature predictions were systematically lower than the analyzed values between the surface and 200 m. (Author)

AD-A075 566/6 PC **A02**/MF **A01**
Scripps Institution of Oceanography La Jolla Ca
On the Dynamics of Neutrally Buoyant Capsules: An Experimental Drop in Lake Tahoe,
J. Cairns , W. Munk , and C. Winant. 28 Oct 77, 16p
Contract N00014-75-C-0155
Pub. in Deep-Sea Research, v26A p369-381 1979.

No abstract available.

N79-33531/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
An Improved Scheme for the Remote Sensing of Sea Surface Temperature.
G. Dalu, C. Prabhakara, R. C. Lo, and M. J. Mack. Jul 79, 29p NASA-TM-80332

A radiometer which possesses two channels in the 11 to 13 micrometer window region is discussed. The radiometer is used to estimate the sea surface temperature within an accuracy of 1 C. A mathematical model is presented to show that the accuracy is improved to within 0.3 C with an independent estimate of total precipitable water vapor. A broadband channel in the 18 micrometer water vapor band is introduced in addition to the two former channels to remotely sense the total precipitable water vapor. The effect of the surface emissivity is taken into account in the scheme.

PB80-111388 PC **A03**/MF **A01**
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
Hydrographic Data from the NOAA Ship Researcher During the October 1977 Ocean Color and Circulation Cruise in the Gulf of Mexico.
Data rept.,
George A. Maul, Gregg G. Thomas, and Terry A. Nelsen. Jul 79, 36p NOAA/TR/ERL/AOML-1, NOAA-79092602

The primary purposes of this cruise were twofold: (1) A study of the eastern Gulf of Mexico region using light sensitive equipment was conducted to sample and identify certain optical properties of the Gulf waters--from the data amassed during this cruise, it is anticipated that an accurate basis for the study of remote sensing of ocean color can be derived; and (2) a survey of the southeastern Gulf of Mexico waters was carried out in order to continue determination of the basic circulation pattern in this area, and to implant a current meter array 100 m above the sill of the Yucatan Strait.

PB80-111453 PC **A06**/MF **A01**
Georgia Marine Science Center, Savannah.
Hydrographic Observations in the Georgia Bight (April 1978),
S. R. Lasley, L. P. Atkinson, J. J. Singer, and W. S. Chandler. Jul 79, 101p TRS-79/5, NOAA-79092405
NOAA-04-7-158-44126
Prepared in cooperation with Skidaway Inst. of Oceanography, Savannah, GA.

This report contains chemical and physical data obtained during Georgia Bight Cruise (10-23 April 1978) aboard the R/V Columbus Iselin. The investigation was part of a larger multi-institutional Department of Energy program to understand event scale, physical, chemical and biological processes of the South Atlantic Bight, the continental shelf region from Cape Hatteras to Cape Canaveral. The study reported here is concentrated in the Georgia Bight near Brunswick, Georgia. The objective was to collect physical and chemical data such that three-dimensional quasi-synoptic measurements of the interactions of shelf and Gulf Stream waters could be made.

8K. Seismology

AD-A075 400/2 PC **A07**/MF **A01**
Northeastern Univ Boston MA Dept of Civil Engineering
State-of-the-Art for Assessing Earthquake Hazards in the United States. Report 13. Probabilistic Seismic Hazard Analysis.
Miscellaneous paper,
Mishac K. Yegian. Jul 79, 138p WES-MP-S-73-1
Contract DACW39-78-M-2652
See also AD-A075 401.

This report presents a comprehensive review of the state of the art of probabilistic seismic hazard analysis. This type of analysis essentially provides information regarding the likelihood that various levels of a ground motion parameter will be exceeded in a given period of time. The report begins with a discussion of the various seismic parameters required for the analysis and the calculation of these parameters based on seismic history data. Problems involved in the estimation of these parameters exclusively on the basis of seismological data are outlined, and emphasis is placed on the need to utilize and incorporate geologic and geophysical information in the analysis. A brief presentation of Baye's theorem and discussion of the procedure for seismic hazard estimation using the theorem are provided. The report continues with a presentation of the various mathematical formulations used in the calculation of seismic hazard probabilities. This section also includes a discussion of the use of computer programs to facilitate the calculations involved in the analysis. Concluding the report is a presentation and discussion of the various practical applications of seismic hazard analysis, emphasizing use in structural and geotechnical engineering. Some recent seismic hazard maps for the U.S. incorporating probability calculations are presented and reviewed in this section. (Author)

AD-A075 401/0 PC **A05**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Civil Engineering
State-of-the-Art for Assessing Earthquake Hazards in the United States. Report 14. Representation of Earthquake Ground Motion: Scaled Accelerograms and Equivalent Response Spectra.
Miscellaneous paper,
Erik H. Vanmarcke. Aug 79, 88p Rept no. WES-MP-S-73-1
Contract DACW39-78-M-3907
See also AD-A075 400.

Alternative representations of earthquake ground motion for the purpose of seismic analysis and design are reviewed and critically examined, with emphasis on the relation between earthquake time histories and response spectra. The results of a study on the effects of scaling earthquake records on peak acceleration are presented. Errors attributable to scaling are evaluated in terms of the response for one-degree elastic and elasto-plastic systems and the equivalent number of cycles of uniform shear stress. The significance of duration and frequency content is assessed in this context. The pitfalls of the practice of using 'standard' design response spectra are pointed out, and methodology is proposed for developing site-specific design response spectra based on appropriate accelerograms from past earthquakes. (Author)

AD-A075 448/1 PC **A04**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS
Visit to Japan to Observe Damage Which Occurred during the Near Izu Oshima Earthquakes, January 14 and 15, 19 8.
Final rept.,
Willima F. Marcuson, III. Aug 79, 51p Rept no. WES-MP-GL-79-20

The magnitude 7.0 earthquake near Izu Oshima occurred at 12:24 p.m. on 14 January 1978. The main aftershock occurred on 15 January and had a magnitude of 5.7. These two earthquakes are believed to have caused liquefaction of tailings and two dam failures which resulted in some 80,000 cu m of tailings flowing down the mountainside and into a stream. These tailings, containing sodium cyanide, contaminated the stream all the way to the Pacific Ocean, a distance of 30 km. The tailings dams were approximately 30 m high and were constructed using the upstream construction method. These dams had been previously analyzed pseudostatically using a seimsmic coefficient of 0.2. This case history clearly indicates that a pseudostatic analysis using routine static soil properties as input is not appropriate if liquefaction is the mode of failure. (Author)

N79-32779/7 PC **A06**/MF **A01**
Preussag A.G., Erdoel und Erdgas, Hannover (Germany, F.R.).
Improvement of the MVD Method (Migration Velocity Determination).
Final Report.
J. Sattlegger. Dec 78, 116p BMFT-FB-T-78-30
Contract BMFT-03E-3118-A/ETS-0003-A
Subm-Prepared in Cooperation with Sattlegger Ingr. Buero fuer Ange. Geophys.
In German; English Summary.

The application of the notion of migration to seismic traces for the purpose of seismic velocity determination is examined. Accurate knowledge of seismic velocities is a prerequisite for good results in geophysical data processing as well as an important aid in the interpretation of a seismic section. The migration velocity determination method is applied to two and three-dimensional problems and a dip selective version is developed for complex cases with interfering events. The development is carried on with a computer method (ANAKON) which allows an improved velocity analysis for selected interfaces. First results of this last method are shown.

N79-32782/1 PC **A03**/MF **A01**
Research Inst. of National Defence, Stockholm (Sweden).
Swedish Earthquakes and Acceleration Probabilities.
R. Slunga. Mar 79, 46p FOA-C-20295-E4

A method to assign probabilities to ground accelerations for Swedish sites is described. As hardly any nearfield data is available, the problem of interpreting macroseismic data in terms of acceleration is posed. Although the correlation between intensity and ground acceleration is poor, the large amount of data collected from several regions gives regression lines with small estimated uncertainties. However, application of these lines to regions of no such data is necessarily very uncertain. This cannot be avoided until relevant instrumental data becomes available. The macroseismic acceleration model as deduced gives epicentral ground acceleration of small Swedish earthquakes in agreement with existing distant instrument data.

N79-33684/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Postseismic Viscoelastic Deformation and Stress. Part 2: Stress Theory and Computation; Dependence of Displacement, Strain, and Stress on Fault Parameters.
S. C. Cohen. Aug 79, 19p NASA-TM-80334

A viscoelastic model for deformation and stress associated with earthquakes is reported. The model consists of a rectangular dislocation (strike slip fault) in a viscoelastic layer (lithosphere) lying over a viscoelastic half space (asthenosphere). The time dependent surface stresses are analyzed. The model predicts that near the fault a significant fraction of the stress that was reduced during the earthquake is recovered by viscoelastic softening of the lithosphere. By contrast, the strain shows very little change near the fault. The model also predicts that the stress changes associated with asthenospheric flow extend over a broader region than those associated with lithospheric relaxation even though the peak value is less. The dependence of the displacements, stresses on fault parameters studied. Peak values of strain and stress drop increase with increasing fault height and decrease with fault depth. Under many circumstances postseismic strains and stresses show an increase with decreasing depth to the lithosphere-asthenosphere boundary. Values of the strain and stress at distant points from the fault increase with fault area but are relatively insensitive to fault depth.

PB80-104813 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
Seismic Risk and Principles of Seismic Zoning (Seismic Design Decision Analysis),
L. V. Kantorovich, V. I. Keilis-Borok, and G. M. Molchan. May 74, 32p INTERNAL STUDY-43, NSF/RA/E-74/535
Grant NSF-GI-27955
Trans. of Russian mono. language by Chivvis-Shahnazarov. See also report dated Mar 74, PB-282 979.

A short, nonmathematical account of basic methods of estimating seismic risk is given. Some preliminary considerations about the use of seismic risk estimates for the most rational seismic zoning and for optimization of a complex of antiseismic measures are presented. To measure seismic risk, it is first necessary to establish models for the following factors: probable number of earthquakes in a given period of time as a function of their energy and coordinates of their centers; intensity of shaking at various points on the earth's surface for each earthquake as a function of their energy and coordinates of their centers; and, the damage caused by shaking of one or another intensity at each point of the object. The effectiveness of antiseismic measures is discussed and a plan for regulating a whole complex of antiseismic measures is outlined. It is felt that the realization of this plan would lead to an essential increase in the population's safety and, also would reduce economic losses from earthquakes.

PB80-104821 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
Algorithm for the Estimation of Seismic Risk (Seismic Design Decision Analysis,
V. I. Keilis-Borok, T. L. Kronrod, and G. M. Molchan. Dec 74, 36p INTERNAL STUDY-46, NSF/RA/E-74/538
Grant NSF-GI-27955
Trans. of Russian mono. language by Chivvis-Shahnazarov. See also report dated Mar 74, PB-282 979.

This report presents an algorithm to calculate the probability characteristics of various effects of a number of earthquakes on a given object in a seismic zone. The algorithm is based on: (1) the sequence of earthquakes in space, time and energy; (2) spatial distribution of intensity of ground tremors from fixed earthquakes; and (3) effects that the given object experiences from ground tremors of a certain intensity. A computer version of the algorithm permits the use of practically any engineering, seismological and economic information necessary for estimates of effects of earthquakes. Definitions of problems and general solutions which may be calculated are given. The problem of calculating a generalized Poissonian distribution which is often encountered in earthquake statistics and in the mathematical theory of risk is discussed.

PB80-106370 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
Optimum Seismic Protection for New Building Construction in Eastern Metropolitan Areas. Ground Motions Measured by VM-1,
Robert V. Whitman, John T. Christian, and Paul J. Trudeau. Sep 72, 22p INTERNAL STUDY-17, NSF/RA/E-72/295
Grant NSF-GK-27955
See also rept. no. 22, PB-293 026.

Field measurements of vibratory ground motions were carried out in the Boston, Massachusetts area using the portable VM-1 instrument to obtain acceleration records. This report describes the places where the data were obtained. It includes soil profiles and typical records of the motions. Some preliminary analyses of the data and conclusions are provided. Measurements of the ambient vibrations due to traffic were made at five sites. Two five pound dynamite charges were exploded in a boring near Site One as the signal for the measurements at Site Six. The explosions were at a depth of about 50 feet. They were set off between 5:00 and 6:00 A.M. to reduce background noise due to traffic. The profiles of these six sites are presented. The VM-1, Vibration Monitor, consists of an acceleration transducer acting as a sensor and a separate recording and filter unit. The recording is done on heat sensitive paper. Typical ambient motion records made at the first five sites are presented. The predominant frequencies picked out by the visual examination of the records are tabulated. The records from the dynamite explosions are presented and the predominant frequencies are tabulated.

PB80-112790 PC**$40.00**
Centro de Estudias Mesoamericano sobre Tecnologia Apropiada (Guatemala).
Proceedings: International Symposium on the February 4th., 1976 Guatemalan Earthquake and the Reconstruction Process. Volumes 1 and 2 (Memorias: Simposio Internacional sobre el Terremoto de Guatemala, del 4 de Febrero de 1976 y el Proceso de Reconstruccion. Volumes 1 and 2).
15 May 78, 1699p
Text in English and Spanish. Sponsored in part by Agency for International Development, Washington, DC., and Instituto de Fomento de Hipotecas Aseguras (FHA), Guatemala, Central America.

In Feb. 4th, 1976 Guatemala suffered the strongest earthquake since 1917. It caused 24,000 deaths and 77,000 wounded. 1 million people were left homeless. This report of 72 papers presented by engineers, geologists, seismologists et al., has as its main objective to study the natural tectonic causes of earthquakes, in order to prevent similar disasters. Papers deal with different aspects of the earthquakes: history of previous quakes in Guatemala, hazards of building constructions, and application of modern theories to calculate earth pressures. Some chapters are quite readable, but some others are written for the specialized mind. Great length is given to the 100 day plan for reconstruction of Guatemala, which can be applied in similar disasters. Conclusions and recommendations for reinforcement of bridges and the problem of 'lifelines' are studied extensively, resulting in Earthquake Reduction Programs for the protection of lives, health, property and welfare.

PB80-801285 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Seismology. Volume 2. 1976-September, 1978 (A Bibliography with Abstracts).
Rept. for 1976-Sep 78,
Audrey S. Hundemann. Dec 79, 266p
See also Volume 1, 1974-1975, NTIS/PS-77/0962.

Abstracts pertaining to seismic wave propagation, earthquake prediction, and geomorphology and geomechanics associated with earthquake activity primarily in the United States and Asia are presented. A few abstracts deal with instrumentation and processing of seismic data. (This updated bibliography contains 260 abstracts, none of which are new entries to the previous edition.)

PB80-801293 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Seismology. Volume 3. October, 1978-October, 1979 (A Bibliography with Abstracts).
Rept. for Oct 78-Oct 79,
Audrey S. Hundemann. Dec 79, 101p
Supersedes NTIS/PS-78/1105, NTIS/PS-77/0963, NTIS/PS-76/0916, NTIS/PS-75/769, and NTIS/PS-75/059. See also Volume 1, 1974-1975, NTIS/PS-77/0962 and Volume 2, 1976-September, 1978, PB80-801285.

Abstracts pertaining to seismic wave propagation, earthquake prediction, and geomorphology and geomechanics associated with earthquake activity primarily in the United States and Asia are presented. A few abstracts deal with instrumentation and processing of seismic data. (This updated bibliography contains 94 abstracts, all of which are new entries to the previous edition.)

8L. Snow, Ice, and Permafrost

AD-A075 246/9 PC **A04/MF A01**
Coast Guard Washington Dc
Report of the International Ice Patrol Services in the North Atlantic Ocean,
K. N. Knutson , and T. J. Neill. 1977, 72p Rept nos. USCG-BULL-63, USCG-188-32

The 1977 International Ice Patrol Service in the North Atlantic Ocean was conducted by the United States Coast Guard under the provisions of Title 46 United States Code, Sections 738, 738a through 738d, and the International Convention for the Safety of Life at Sea, 1960, Regulations 5 through 8. The International Ice Patrol is a service for observing and dissiminating information on ice conditions in the Grand Banks Region of the Northwest Atlantic Ocean. During the ice season, the southeastern, southern and southwestern limits of the regions of icebergs in the vicinity of the Grand Banks of Newfoundland are guarded for the purpose of informing passing ships of the extent of this dangerous region. The International Ice Patrol also studies ice conditions in general with emphasis on the formation, drift and deterioration of icebergs, and assists ships and personnel requiring aid within the limits of operation of the Ice Patrol forces. The International Ice Patrol is directed from the Ice Patrol Office located at the U.S. Coast Guard Base, Governors Island, New York. The Office gathers ice and environmental data from a variety of sources, maintains an ice plot, forecasts ice conditions, prepares the twice-daily Ice Bulletin, replies to requests for special ice information, and executes operational control of the Aerial Ice Reconnaissance Detachment, the Ice Patrol oceanographic cutter, and the Surface Patrol cutter when assigned.

AD-A075 455/6 PC **A02/MF A01**
Princeton Univ NJ Dept of Civil and Geological Engineering
The Critical Velocities of a Floating Ice Plate Subjected to In-Plane Forces and a Moving Load,
Arnold D. Kerr. Aug 79, 16p CRREL-79-19
Contract DACA89-73-C-0228

The critical velocities of loads moving over floating ice plates have been determined by several authors. In all these analyses it was assumed that the in-plane force field in the ice cover is zero. However, due to constrained thermal strains, in-plane forces do occur in the field. The purpose of the present paper is to determine their effect upon the critical velocities of the moving loads. It is shown that a uniform compression force field reduces the critical velocity, whereas a tension force field has the opposite effect. (Author)

AD-A075 474/7 PC **A02/MF A01**
Cold Regions Research and Engineering Lab Hanover NH
A Volumetric Constitutive Law for Snow Subjected to Large Strains and Strain Rates,
Robert L. Brown. Aug 79, 20p Rept no. CRREL-79-20

A volumetric constitutive equation was developed to characterize the behavior of snow subjected to large compressive volumetric deformations. By treating the material as a suspension of air voids in a matrix material of polycrystalline ice, a rate-dependent volumetric constitutive law was formulated and found to accurately predict material response to pressure loads for a wide range of load rates. Comparison of the theory with shock wave data was not considered in this paper, although the constitutive law appears to be valid for such load situations. One application to oversnow mobility of tracked vehicles was made. In this case, power requirements due to snow compaction were calculated parametrically in terms of vehicle speed, track loading, and snow density.

PB80-801301 PC **N01/MF N01**
National Technical Information Service, Springfield, VA.
Snow Studies. Volume 2. 1975-October, 1979 (A Bibliography with Abstracts).
Rept. for 1975-Oct 79,
Robena J. Brown. Dec 79, 258p
Supersedes NTIS/PS-78/1144, NTIS/PS-77/1005, NTIS/PS-76/0809, NTIS/PS-75/719, and NTIS/PS-75/042. See also Volume 1, 1964-1974, NTIS/PS-76/0808.

The bibliography covers research on snow cover, snowmelt, snowdrifts, snow removal, trafficability, snow rescue and survival, physical and mechanical properties, as well as detection by remote sensing. Applications include construction of roads, runways, buildings, pipelines, etc., in cold, remote, arctic, or subarctic regions. (This updated bibliography contains 253 abstracts, 29 of which are new entries to the previous edition.)

8M. Soil Mechanics

AD-A075 297/2 Not available NTIS
Massachusetts Inst of Tech Cambridge Dept of Civil Engineering
Application of the Andrade Equation to Creep Data for Ice and Frozen Soil,
J. M. Ting, and R. Torrence Martin. 14 Dec 78, 8p ARO-14725.1-GS
Contract DAAG29-77-C-0016
Availability: Pub. in Cold Regions Science and Technology, v1 p29-36 1979 (No copies furnished by DTIC).

No abstract available.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. Components

AD-A075 066/1 PC **A03/MF A01**
Fulmer Research Inst Ltd Stoke Poges (England)
Field Emission Cold Cathode Devices Based on Eutectic Systems.
Interim rept. 1 May 77-30 Apr 78,
Duncan Stewart, Paul D. Wilson, and Vivian G. Rivlin. Jul 79, 40p R744/2, RADC-TR-79-170
Grant AFOSR-77-3292

A survey has been made of the performance as field emission cold cathodes of selected refractory materials fabricated as needle arrays by unidirectional solidification. Specially designed apparatus was used to observe the operating lifetimes and Fowler-Nordheim functions of needle arrays of niobium carbide, tantalum carbide in a nichrome matrix and of a gamma/gamma primed - alpha eutectic in the Ni Mo Ta Al system. The results are co-related with SEM observations. Thermodynamic stabilities under the operating conditions are discussed. (Author)

AD-A075 282/4 PC **A05/MF A01**
Pennsylvania State Univ University Park Applied Research Lab
The Design of Piezoelectric Transducers Using Goal Programming.
Master's thesis,
Diana F. McCammon. 11 Jun 79, 97p Rept no. ARL/PSU/TM-79-140
Contract N00024-79-C-6043

The design of piezoelectric transducers often involves the satisfaction of multiple, conflicting design specifications. The use of conventional mathematical programming techniques in this endeavor has been inhibited by their inability to consider these multiple objectives within their design formulations. Goal programming is an effective alternative methodology. Transducer design analysis through goal programming provides the optimal solution to the multiple criteria of various types of transducers. The solutions to five design specifications for a reasonably complex transducer are presented. The details of the formulation and analysis of results provide an indication of the ability of this approach to resolve even more complex transducer design problems. (Author)

AD-A075 353/3 PC **A04/MF A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Investigation of Electroplated Electrical Contacts.
Final rept. Oct 65-Oct 78,
William H. Kohlmann. Oct 79, 55p Rept no. DTNSRDC-79/092

The relative deterioration by marine atmospheres of noble metal platings for electric contacts has been determined in the interests of improving the reliability of electrical connections in the marine environment and of conserving precious metals. In coopertaion with the Electronics Industry Association P-5.1 Committee on Electrical Contacts, this Center investigated the effects of marine and laboratory salt spray atmospheres on various contact platings in order to determine optimum platings; the emphasis was on platings with silver underplating. The work described includes establishment of experimental techniques, equipment development, a discussion of the marine exposure site at Ft. Tilden, New York, and the laboratory salt spray environment and procedures. The results with various platings show that the use of nickel as an underplating is very undesirable, but 30 millionths of an inch of gold over 100 millionths of an inch of silver is superior, and 30 millionths of an inch of gold over 100 millionths of an inch of copper is adequate in the marine environment. An examination of 4000 hours of laboratory salt spray exposure and 108,000 hours (11-1/2 years) of marine exposure indicates a corrosion acceleration factor ranging from 18 to 25 for gold-over-nickel plating systems. (Author)

AD-A075 424/2 PC **A02/MF A01**
Army Electronics Research and Development Command Fort Monmouth NJ Electronics Technology/Devices Lab
New Samarium-2 Cobalt-17-Based Compounds for Permanent Magnet Applications.
Technical rept.,
F. Rothwarf, H. A. Leupold, A. Tauber, J. T. Breslin, and R. L. Bergner. Sep 79, 14p Rept no. DELET-TR-79-20

The magnetic properties of several samarium-2 cobalt-17-based alloy systems potentially useful for microwave/millimeter-wave applications are reviewed. Two types of materials are discussed. One contains heavy rare earth substituents for some samarium in an attempt to achieve intrinsically temperature stabilized magnets. The other contains manganese or chromium substituents for some cobalt in the samarium-2(cobalt, iron, copper, zirconium)-17 type compound in an effort to enhance the coercivity and to attain a more linear demagnetization curve for this material, which already has an energy product of 30 megagauss oersteds. (Author)

AD-A075 479/6 PC **A02/MF A01**
Hughes Research Labs Malibu Ca
GaAs Surface Passivation for Device Applications.
Interim rept. no. 1, 15 Jun-15 Dec 78,
C. L. Anderson , M. D. Clark , and J. W. Peters. Mar 79, 21p AFAL-TR-79-1057
Contract F33615-78-C-1444

This report describes the initial stages of a program to develop deposited dielectrics for GaAs device applications. Three applications of the dielectrics are being investigated: (1) isolation of control electrodes, (2) passivation of the GaAs surface, and (3) encapsulation of completed circuits. The dielectrics being studied include silicon oxynitride; mixtures of silicon nitrode and germanium nitride; and mixtures of silicon dioxide, gallium oxide, and aluminum oxide. Deposition techniques being employed are pyrolytic chemical vapor deposition, plasma-enhanced deposition, and photochemical deposition. This report describes the apparatus being used for this program and the chemical analysis of preliminary films deposited. No interface state measurements are reported. (Author)

CONF-7810156- PC **A08/MF A01**
Bechtel National, Inc., San Francisco, CA.
Installation of Underground Power Transmission Cables. Proceedings of a Department of Energy Workshop.
Jun 79, 162p
Contract ET-78-C-01-2851
Workshop for installation of underground power transmission cables, Pittsburgh, PA, USA, 2 Oct 1978.

The proceedings of a Department of Energy-sponsored workshop in the installation of underground power transmission cables are reported. The workshop was held in Pittsburgh, Pennsylvania, October 2--5, 1978. Sixty-two participants, representing equipment manufacturers, utilities, contractors,

universities, and government agencies, were divided into topic groups covering specific installation activities. Discussion was directed toward a review of the state of the art in underground cable installation, future equipment and technique development requirements, and the formulation of conclusions and recommendations. The principal technological problem for underground installation is the lack of ability to locate underground obstacles, principally in urban and suburban areas. Development of a sensing system to locate obstacles was given a high priority by nearly all topic groups. The lack of market definition was seen as the principal impediment to competition and development of specialized equipment. Most participants felt that the federal government must assume a role in research and development of new equipment and techniques. However, the participants did not favor increased federal regulation of underground cable installation systems. (ERA citation 04:051419)

DOE/ET-5041-1 PC **A12**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Assessment of Sodium Conductor Distribution Cable.
Jun 79, 271p
Contract EC-77-C-01-5041

The study assesses the barriers and incentives for using sodium conductor distribution cable. The assessment considers environmental, safety, energy conservation, electrical performance and economic factors. Along with all of these factors considered in the assessment, the sodium distribution cable system is compared to the present day alternative - an aluminum conductor system. (ERA citation 04:051427)

N79-32464/6 PC **A03**/MF **A01**
RCA Government Communications Systems, Camden, N. J. Advanced Technologies Labs.
Silicon-Gate CMOS/SOS Processing.
P. Ramondetta. Mar 79, 27p NASA-CR-150319
Contract NAS8-31325

Major silicon-gate CMOS/SOS processes are described. Sapphire substrate preparation is also discussed, as well as the following process variations: (1) the double epi process; and (2) ion implantation.

N79-32483/6 PC **A04**/MF **A01**
Allgeneine Elektricitaets-Gesellschaft, AEG Telefunken, Heilbronn (Germany, F.R.). Serienprodukte A.G.
PNP: Planar Transistor Technology.
Final Report.
D. Zerrweck, and N. Peters. Nov 78, 59p BMFT-FB-T-78-20
Contract BMFT-NT-372
In German; English Summary.

The increase of junction capacitance due to the formation of inversion layers deteriorates the performance of PNP-RF devices. To prevent an increase in reverse current and junction capacitance, different methods of eliminating boron redistribution and ionic contamination were investigated. A technique for reducing boron redistribution during thermal oxidation as well as methods for preventing ionic contamination of the oxide are presented. Surface state charge density of the Si-SiO2 interface was identified as the cause of inversion layers at the collector surface of PNP silicon planar translators. A scheme for counteracting this effect is also given.

N79-32484/4 PC **A05**/MF **A01**
Siemens A.G., Munich (Germany, F.R.). Unternehmensbereich Bauelemente.
Modern Technology for Semiconductor Devices.
Final Report.
W. Henning, and E. Pammer. Nov 78, 76p BMFT-FB-T-78-21
Contract BMFT-NT-312
In German; English Summary.

Processes and machines for chemical vapor deposition of silicon dioxide, aliminium silicate, and silicon nitride layers were developed. The quality and applications of these layers were examined. Moreover, the deposition of gold films, antimony, and arsenic from organic varnishes is described. In order to achieve a drastic increase in the frequency of planar silicon microwave transistors it was necessary to elaborate extremely shallow diffusion methods involving the application of arsenic and boron. The control of reliable multilayer metal contacts based titanium-platinum-gold interfaces is thereby of significant importance. Results obtained through the various techniques described are given to illustrate this control principle.

N79-32486/9 PC **A07**/MF **A01**
Brown, Boveri und Cie, A.G., Heidelberg (Germany, F.R.). Zentrales Forschungslabor.
Technology of Interfaces on Silicate Glass Passivated Semiconductor Power Devices.
Final Report.
A. Neidig, K. Weimann, and G. Wahl. Dec 78, 136p BMFT-FB-T-78-40
Contract BMFT-NT-466
In German; English Summary.

As an alternative to unstable silicon polymers, a surface passivation for p-n junctions of semiconductor power devices not hermetically sealed was developed using chemical vapor deposition (CVD) of silicate glasses from dilute mixtures of SiH4, B2H6, PH3, and O2. The CVD silicate layers which are approximately one micrometer thick fulfill all stability requirements after temperature treatment against charge instabilities caused by penetration of atmospheric water vapor. A reproducible sandblasting method was also developed for the double positive edge beveling of high voltage power thyristors because conventional negative bevel angles are limited by breakdown voltages up to 4kV. The stability of the double positive bevel angle was improved by using a combination of CVD glass and silicon polymers.

N79-32488/5 PC **A04**/MF **A01**
Siemens A.G., Munich (Germany, F.R.). Unternehmensbereich Bauelemente.
Ferrites with Anomalous Hysteresis Loops for Communication Systems.
Final Report.
M. Zenger, I. Hanke, U. Wagner, and P. Jiru. Dec 78, 75p BMFT-FB-T-78-54
Contract BMFT-NT-0525
In German; English Summary.

To reduce the volume of filter coils for telecommunications to a great extent, ferrites are necessary with very low losses and an improved stability in regards to time and temperature. For this purpose only Mn-Zn-ferrites with anomalous hysteresis loops seem to be favorable. Ferrites of the Perminvar type, containing small amounts of co-ions, were annealed after sintering to get very low loss characteristics and to stabilize the magnetic values. The magnetic values were then determined experimentally at 100 KHz and at 1 MHz, between 20 and 60C, and over a period of from 100 to 1000 minutes. The magnetic properties of isoperm-ferrites with a combined Sn And Ti- substitution sintered under appropriate conditions were also determined.

N79-32566/8 PC **A03**/MF **A01**
Danish Research Center for Applied Electronics, Hoersholm.
Light Emitting Diodes. A Comparative 10,000 Hour Service Test of Light Emitting Diodes, Including 26 Variants from 15 Manufacturers.
H. J. Nordby. Nov 78, 42p ECR-85
Subm-Sponsored by Soc. For Reliability and Environ. Testing (Spm). Misc-Original Contains Color Illustrations.

Visible (23 types) and infrared (3 types) light emitting diodes (LED) were tested. Each type of LED was represented in four groups and exposed to four different environments. None of the LED's were overloaded with respect to the manufacturer's specifications. During the service life test the radiant flux from each LED was measured and recorded. In this way it was possible to produce a degradation curve (radiant flux versus elapsed time) for each exposure. The results of the investigation demonstrate that all devices show degradation during the 10,000 hour test. Some 30% of the devices show an average degradation or more that 50% while some 2.4% of the LED's show catastrophic failure.

N79-32628/6 PC **A03**/MF **A01**
RCA Advanced Technology Labs., Camden, N. J. Government Systems Div.
Expansion of CMOS Array Design Techniques.
Final Report.
A. Feller, and P. Ramondetta. Mar 77, 43p
NASA-CR-150318
Contract NAS8-31325

The important features of the multiport (double entry) automatic placement and routing programs for standard cells are described. Measured performance and predicted performance were compared for seven CMOS/SOS array types and hybrids designed with the high speed CMOS/SOS cell family. The CMOS/SOS standard cell data sheets are listed and described.

N79-33025/4 PC **A04**/MF **A01**
Heimann G.m.b.H., Wiesbaden (Germany, F.R.).
Development of Suitable Semi-Conductor-Evaporated Coatings for a Color-Striped Vidicon for a Single Tube Color Camera.
Final Report.
C. Kunze, and B. Heimann. Dec 78, 70p BMFT-FB-T-78-39
Contract BMFT-NT-0580
In German; English Summary.

The development of a television pick-up tube for a one-tube color television camera, having specific performance characteristics, is described. The performance constraints are a broad spectral distribution of photosensitivity in the visible part of the spectrum, gamma = 1, low lag, high sensitivity, the use of simple technology, and a stripe filter integrated with the photoconductive layer. The first five constraints were met by the development of a CdSe-As2Se3-photoconductive layer, but owing to the high activation temperature of the layer, an integration with the stripe filter was not possible. This problem was solved by using a fiber optic front plate. The prototype tubes were evaluated in an Interplex-Sicolor camera. It is shown that this pick-up tube is superior to a Sb2S3 vidicon with respect to sensitivity and color fidelity. The sensitivity is increased by a factor of three high color fidelity and by a factor of 10 with low incorrectness in the red channel.

N79-33060/1 PC **A04**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Plasmaforschung.
Untersuchungen Zur Vergroesserung der Bandbreite Schneller Avalanche-Photodioden durch Kapazitaetskompensation (The Enlargement of Fast Avalanche Photodiode Bandwidths by Capacitance Compensation).
H. Zwicker. 1977, 63p IPF-77-3
Language in German.

Photodiodes are convenient devices for plasma diagnostics. The diode signal is meaningful only when it exceeds that due to amplifier noise. This implies a load resistance greater than 30 kV. Diode and stray capacitance (6 to 20 pF) limit the frequency bandwidth to below the required 3.33 Hz. Capacity compensation enables these criteria to be fulfilled. The corresponding electronics (negative impedance converter compensation, null compensation) are described together with a detailed analysis of their functions.

N79-33398/5 PC **A06**/MF **A01**
Siliconix, Inc., Santa Clara, Calif.
Development and Fabrication of Low ON Resistance High Current Vertical VMOS Power FETS.
Final Report.
S. Kay. Aug 79, 117p NASA-CR-159646
Contract NAS8-21034

The design of a VMOS Power FET exhibiting low ON resistance, high current as well as high breakdown voltage and fast switching speeds is described. The design which is based on a 1st-order device model, features a novel polysilicon-gate structure and fieldplated groove termination to achieve high packing density and high breakdown voltage, respectively. One test chip, named VNTKI, can block 180 V at an ON resistence of 2.5 ohm. A 150 mil x 200 mil (.19 cm2) experimental chip has demonstrated a breakdown voltage of 200 v, an ON resistence of 0.12 ohm, a switching time of less than 100 ns, and a pulsed drain - current of 50 A with 10 V gate drive.

PAT-APPL-6-073 579 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Multistage Depressed Collector for Dual Node Operation.
Patent Application,
H. G. Kosmahl. Filed 7 Sep 79, 14p N79-32463/8, NASA-CASE-LEW-13282-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A depressed collector is described which captures the spent electrons of a microwave transmitting tube at high efficiency in both high and low power modes of operation. The end electrode has a spike extending toward the entrance electrode. Intermediate electrodes and the entrance electrode have central apertures increasing in size in a downstream direction. These electrodes capture most high power mode spent electrons. A low power mode electrode is positioned between the last intermediate electrode and the end electrode to capture low power spent electrons. This electrode has a central aperture preferably smaller but no larger than that of the last intermediate electrode. An auxiliary low power mode electrode with a central aperture larger than that of the low power mode electrode may be axially positioned between the end electrode and the low power mode electrode. The electrodes are all at voltages provided by a voltage divider connected between a negative potential and a common ground return.

SAN-1403-3 PC **A03**/MF **A01**
Hughes Research Labs., Malibu, CA.
Arc Quenching in Sulfur Hexafluoride Gas Insulated Structures. Quarterly Report 3, December 16, 1977--March 15, 1978.
Apr 78, 30p
Contract EC-77-C-03-1403

The basic goal of this project is to develop an arc-quenching system (AQS) to protect SF sub 6 -filled underground cable from permanent damage when the cable is subjected to an arc while in regular service. The concept being pursued is to develop an arc quencher with normally very high impendance that can be electrically located between the current-carrying conductor in the cable and ground. When an arc ocurs, the arc quencher switches rapidly to a low-impedance mode and either diverts or force-commutates the current from the arcing fauit. If done quickly enough, this will permit the cable to recover its full dielectric capability. During the first nine months of the program, the nature of arcs in SF sub 6 was studied, a laboratory-model arc quencher was constructed and tested, the various possible arc quencher configurations were listed, and AQS studies both analytically and with a hybrid computer model were studied. The complex set of quantitative results have not yet yielded a design baseline that is considered sufficiently practical, reliable, and economical for use in a power system. These analyses will be continued through the next quarter. (ERA citation 04:051430)

9B. Computers

AD-A075 060/4 PC **A02**/MF **A01**
United Technologies Research Center East Hartford Conn
Microprocessor Requirements for Implementing Modern Control Logic.
Technical progress rept. no. 1, 1 Mar-31 Aug 79,
Florence A. Farrar , and James R. Krodel. 14 Sep 79, 25p UTRC/R79-944590-1, AFOSR-TR-79-1044
Contracts F49620-79-C-0078, F49620-78-C-0017

The objective of this research investigation is to develop and evaluate analytical procedures for establishing microprocessor requirements for implementing modern control logic. Key issues in microprocessor implementation of modern control logic include: (1) accuracy, (2) computational capability, and (3) memory requirements. These requirements must be established for the interface as well as for the microprocessor control code. (Author)

AD-A075 108/1 PC **A05**/MF **A01**
Sri International Menlo Park Ca
A JOVIAL Verifier.
Interim rept. 14 Nov 77-31 Dec 78,
B. Elspas , M. W. Green , M. S. Moriconi , and R. E. Shostak. Jul 79, 81p SRI-6977-1, RADC-TR-79-195
Contract F30602-78-C-0031

This Interim Report describes progress during the first year of research and development on a program verification system supporting the design, development, and formal verification of programs written in JOVIAL-J73-I. The work reported here represents an outgrowth and continuation of earlier efforts concerned with JOVIAL-J3 (JOCIT version). Detailed descriptions are presented of progress and future plans in the following areas: (a) Analysis of the JOVIAL-J73/I language with respect to verifiability, leading to formal definitions of its syntax and semantics, and to the enhancement of the language by assertion constructs for the purposes of specification and verification (b) The organization, technical development, and implementation of portions of the JOVIAL Verifier - in particular, of a verification condition generator and deductive subsystems; (c) The selection, analysis, and verification of two real software systems of significant size and complexity, critical parts of which will be implemented in J73/I and which is hoped to be verified by means of the JOVIAL Verifier. (Author)

AD-A075 123/0 PC **A03**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
ESER ES 1020 Logical-Functional Structure and Design of the System,
Christian Markert. 11 May 79, 38p Rept no. FTD-ID(RS)T-0545-79
Edited trans. of Rechentechnik Datenverarbeitung (German D. R.) v10 n11 p31-43 Nov 73.

No abstract available.

AD-A075 124/8 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Software for a Uniform Electronic Digital Computer System,
Wladyslaw Klepacz. 10 May 79, 15p Rept no. FTD-ID(RS)T-0546-79
Edited trans. of Informatyka (Poland) v9 n8 p16-19 Aug 73, by F. Zaleski.

No abstract available.

AD-A075 129/7 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
On Certain Aspects of Teleinformation Networks: Computer Networks,
Janusz W. Sowinski. 1 Jun 79, 11p Rept no. FTD-ID(RS)T-0656-79
Edited trans. of Wiadomosci Telekomunikacyjne (Poland) n11-12 p359-361 1976, by Thaddeus Szkoda.

No abstract available.

AD-A075 144/6 PC **A02**/MF **A01**
Aerospace Medical Research Lab Wright-Patterson AFB Oh
SAINT: A Combined Simulation Language for Modeling Large, Complex Systems.
Proceedings paper,
D. J. Seifert , and G. P. Chubb. Oct 78, 8p Rept no. AMRL-TR-78-48
Presented at the Simulation Special Interest Group Conference (1978), 4-6 Sep 78, Canberra, Australia.

SAINT is a FORTRAN based, network-oriented, combined simulation language for modeling large, complex systems with continuous and discrete event components that interact and possess time varying properties. The acronym stands for Systems Analysis of Integrated Networks of Tasks. The paper presents an overview of the basic features and concepts incorporated into SAINT and reviews some of the applications made to date. References are provided to the reports documenting SAINT and its applications. (Author)

AD-A075 181/8 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Structured Programming and the Technique of Developing Programming Systems,
Radomir Jankovic. 5 Apr 79, 21p Rept no. FTD-ID(RS)T-2286-78
Edited trans. of Nauchno-Tehnicki Pregled (Yugoslavia) v27 n1 p49-55 1977, by Michael Peter Bakich.

No abstract available.

AD-A075 191/7 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
The X-Y Plotter as an Output Unit for ODRA 1325 Computer,
Urszula Kreglewska , Thomasz Kreglewski , and Andrzej Lewandowski. 23 Feb 79, 14p Rept no. FTD-ID(RS)T-0049-79
Edited trans. of Pomiary, Automatyka, Kontrola (Poland) v23 n7 p257-259 1977, by E. Zolar.

No abstract available.

AD-A075 217/0 PC **A02**/MF **A01**
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
The Measurement and Evaluation of Alternative Computer Architectures.
Final rept. 1 Jul 77-30 Jun 79,
William B. Dietz. 5 Oct 79, 8p ARO-15065.1-EL
Grant DAAG29-77-G-0155

This is a brief report on some work done at Carnegie-Mellon University on computer architecture certification and work on an operating system for CM*, a multiple processor architecture. (Author)

AD-A075 228/7 PC **A06**/MF **A01**
Battelle Columbus Labs Oh
The State-of-the-Art in Software Error Data Collection and Analysis.
Final rept.,
Robert Thibodeau. 31 Jan 78, 117p
Contract DAAG29-76-D-0100
Prepared in cooperation with General Research Corp., Huntsville, AL. Economics and Resource Planning Operation.

Part of a comprehensive research program directed toward improving software reliability, this review of the state of the art in software error data collection and analysis describes the efforts of government agencies, educational institutions and private companies to collect and analyze software data. The author points out significant shortcomings in all present approaches to data collection which make the results of other organizations of marginal value to Army information system development programs. A proposed Army research program outlines a system of error data collection and analysis which the author believes will prove valuable in the effort to improve the quality of delivered software. (Author)

AD-A075 236/0 PC **A04**/MF **A01**
Defence Research Establishment Valcartier (Quebec)
Extracteurs Sequentiels pour L'Acquisition de Cibles sur Images (Sequential Extractors for Target Acquisition on Images),
L. Sevigny. Aug 79, 61p Rept no. DREV-R-4153/79
Text in French; abstract in English.

No abstract available.

AD-A075 268/3 PC **A08**/MF **A01**
Stanford Univ Calif Dept of Computer Science
Performance of Update Algorithms for Replicated Data in a Distributed Database.
Doctoral thesis,
Hector Garcia-Molina. Jun 79, 164p Rept nos. STAN-CS-79-744, STAN-CSL-TR-172
Contract MDA903-77-C-0322

In this thesis we study the performance of update algorithms for replicated data in a distributed database. In doing so, we also investigate several other related issues. We start by presenting a simple model of a distributed database which is suitable for studying updates and concurrency control. We also develop a performance model and a set of parameters which represent the most important performance features of a distributed database. The distributed database models are used to study the performance of update algorithms for replicated data. This is done in two steps. First the algorithms are analyzed in the case of completely replicated databases in a no failure, update only environment. Then, the restrictions that we made are eliminated one at a time, and the impact on the system performance of doing this is evaluated. For the first step, we develop a new technique for ana-

lyzing the performance of update algorithms. This iterative technique is based on queueing theory. Several well known update algorithms are analyzed using this technique. The performance results are verified through detailed simulations of the algorithms. The results show that centralized control algorithms nearly always perform better than the more popular distributed control algorithms.

AD-A075 291/5 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Architecture Machine Group
Books without Pages,
Nicholas Negroponte. Jul 79, 10p
Contracts N00014-75-C-0460, MDA903-77-C-0037
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

Computer Graphics has been a vector oriented high technology for interaction and its images have been those of a silent movie. Current trends toward raster scan in general are bringing together the previously disjoint communities of image processing, broadcast television and computer graphics. Present implementations in video format are making computer graphics ubiquitous. Jointly, these events are leading to broader definitions of man-machine interaction and more generalized applications of computer resources. The user community is growing to include people like: presidents of companies, housewives, six year old children. In this light, this paper is about not throwing away the message with the medium while offering new technological opportunities for communication. In many regards the old fashioned book remains the best random access information resource we have, but new opportunities include: personalization, sound synchronization, spatial data access. (Author)

AD-A075 383/0 PC **A04**/MF **A01**
Boston Coll Chestnut Hill Mass Space Data Analysis Lab
Numerical and Data Analysis Techniques Applied to Scientific Research. III.
Final rept. 1 Jan 76-31 Dec 78,
Neil J. Grossbard , Joseph E. Martine , Edward N. Richards , Theodore Persakis , and Robert Boudreau. 31 May 79, 72p BC-SDAL-79-1, AFGL-TR-79-0132
Contract F19628-76-C-0147
See also Rept. no. AFGL-TR-76-0091, AD-A034 047.

This report describes the mathematical and numerical analysis techniques used in the solution of three of the major problem efforts engaged in under Air Force Contract F19628-76-C-0147. Although many other problems were solved under this contract, the analysis and techniques utilized were for the most part similar with variations to those described in the two previous reports. (Author)

AD-A075 396/2 PC **A02**/MF **A01**
Pritsker and Associates Inc West Lafayette Ind
Modeling and Analysis Using SAINT: A Combined Discrete/Continuous Network Simulation Language,
David B. Wortman , Steven D. Duket , and Deborah J. Seifert. Sep 77, 12p AMRL-TR-77-78
Contract F33615-76-C-5012
Presented at the Winter Computer Simulation Conference, Society for Computer Simulations, 5-7 Dec 77, Gaithersburg, MD.

SAINT, Systems Analysis of Integrated Networks of Tasks, is a network modeling and simulation technique developed to assist in the design and analysis of complex man-machine systems. SAINT provides the concepts necessary to model systems that consist of tasks (discrete elements), state variables (continuous elements), and interactions of the contribution that system components make to overall system performance. (Author)

AD-A075 402/8 PC **A04**/MF **A01**
Stanford Univ Calif Dept of Computer Science
Applications-Oriented AI Research: Medicine.
Technical rept.,
Victor B. Cieslelski , James S. Bennett , Paul R. Cohen , Avron Barr , and Edward A. Feigenbaum. Aug 79, 62p Rept nos. STAN-CS-79-757, HPP-79-23
Contract MDA903-77-C-0322, ARPA Order-3423
Sponsored in part by Grant PHS-RR-643.

Those of us involved in the creation of the Handbook of Artificial Intelligence, both writers and editors, have attempted to make the concepts, methods, tools, and main results of artificial intelligence research accessible to a broad scientific and engineering audience. Currently, AI work is familiar mainly to its practicing specialists and other interested computer scientists. Yet the field is of growing interdisciplinary interest and practical importance. With this book we are trying to build bridges that are easily crossed by importance. With this book we are trying to build bridges that are easily crossed by engineers, scientists in other fields, and our own computer science colleagues. In the Handbook we intend to cover the breadth and depth of AI, presenting general overviews of the scientific issues, as well as detailed discussions of particular techniques and important AI systems. Throughout we have tried to keep in mind the reader who is not a specialist in AI.

AD-A075 415/0 PC **A03**/MF **A01**
Naval Postgraduate School Monterey Ca
Distributed Shortest Path Algorithms for Computer Networks.
Technical rept.,
Jin Y. Yen. Aug 79, 38p Rept no. NPS55-79-017

This paper presents two distributed algorithms for finding shortest paths from a source node to all other nodes in an N-node network. These algorithms are executed at individual nodes using only local information. Algorithm 1 works in networks where there are no topological changes such as link failures, link recoveries or changes of link lengths. Algorithm 2 is a mofification of Algorithm 1 for networks where there are topological changes. Algorithm 1 determines the optimal shortest paths in at most N3/4 steps, which is only one-half of the computational upper bounds of Abram and Rhodes' and Segall, Merlin and Gallager's algorithms. After the last topological change, Algorithm 2 determines the optimal shortest paths in the same number of steps as Algorithm 1. There are many situations where the present algorithms will work up to N/2 times faster than the algorithms proposed by these authors. (Author)

AD-A075 427/5 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Architecture Machine Group
Graphical Input Techniques.
Technical rept.,
Andrew Lippman , and Nicholas Negroponte.
Sep 79, 25p ARI-TR-409
Grant DAHC19-78-G-0008
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

A graphic work station has been created where three aspects of man-machine interaction may be tested: (1) interaction with a flat display; (2) coplanar input and output; and (3) the ability to 'see through your hand' to a display below. All three are created by a suitable arrangement of mirrors to direct a projected television image to a back-projection screen which is in turn optically superimposed onto a data tablet surface via a semi-transparent mirror. Uses and benefits of the device are demonstrated by means of a set of games which simulate a situation where a user must interact with dynamically changing data and imagery, and annotation programs where rapid data entry from hard copy is required. (Author)

AD-A075 469/7 PC **A04**/MF **A01**
Computer Corp of America Cambridge Ma
Datacomputer and SIP Operations.
Semi-annual technical rept. Jan-Jun 79,
Donald E. Eastlake, III , Matthew Maltzman , Joanne Z. Sattley , and Steven A. Zimmerman. 31 Jul 79, 58p Rept no. CCA-79-22
Contract N00039-79-C-0203, ARPA Order-3540

During the first half of 1979, Computer Corporation of America continued to provide its network-oriented database management utility, the Datacomputer, which is used by the seismic research community and by other users in diverse general networking applications. The Datacomputer's software system is designed to allow convenient and timely access to large on-line databases and to promote data sharing by multiple remote users communicating over a network.

AD-A075 515/7 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
The Use of Linear Prediction for the Interpolation and Extrapolation of Missing Data and Data Gaps Prior to Spectral Analysis.
Technical note,
Stephen B. Bowling , and Shu T. Lai. 18 Jun 79, 25p TN-1979-46, ESD-TR-79-160
Contract F19628-78-C-0002

The spectral analysis of a series of equally spaced samples of a time-stationary process becomes difficult when samples are missing or sizable data gaps occur within the interval of interest. A linear prediction algorithm can be used to fill in the missing data with estimates that are spectrally consistent with the data that are observed. Simulated and practical radar examples demonstrate an improvement in resolution and a reduction of sidelobe interference levels. Computer programs are provided which accomplish the extrapolation and interpolation for complex data. (Author)

AD-A075 517/3 PC **A04**/MF **A01**
Stanford Univ Calif Dept of Computer Science
Applications-Oriented AI Research: Education.
Technical rept.,
William J. Clancey , James S. Bennett , and Paul R. Cohen. Jul 79, 65p Rept nos. STAN-CS-79-749, HPP-79-17
Contract MDA903-77-C-0322, ARPA Order-3423
Sponsored in part by Contract PHS-RR-00785-06.

Those of us involved in the creation of Handbook of Artificial Intelligence, both writers and editors, have attempted to make the concepts, methods, tools, and main results of artificial intelligence research accessible to a broad scientific and engineering audience. Currently, AI work is familiar mainly to its practicing specialists and other interested computer scientists. Yet the field is of growing interdisciplinary interest and practical importance. With this book we are trying to build bridges that are easily crossed by engineers, scientists in other fields, and our own computer science colleagues. This report contains the section of the Handbook on educational applications research. The goal of CAI research is to construct instructional programs that incorporate well-prepared course material in lessons that are optimized for each student. Early programs were either electronic 'page-turners' which printed prepared text or drill-and-practice monitors, which printed problems and responded to the student's solutions using prestored answers and remedial comments. In the Intelligent CAI(ICAI) programs of the 1970s, course material is represented independently of teaching procedures so that problems and remedial comments can be generated differently for each student. Research today focuses on the design of programs that can offer instruction in a manner that is sensitive to the student's strengths weaknesses, and preferred style of learning. The role of AI in computer-based instruction applications is seen as making possible a new kind of learining environment.

AD-A075 538/9 PC **A03**/MF **A01**
Stanford Univ Calif Stanford Electronics Labs
SYNDIA User's Guide.
Technical rept.,
Warren E. Cory. Aug 79, 40p Rept nos. SU-SEL-79-028, TR-176
Contracts DAAG29-79-C-0047, N00014-75-C-0601

This report describes how to use the Syndia/Syngra system available at SU-SCORE. This system accepts a BNF-like grammar specification and automatically generates syntax diagrams on a Tektronix graphics terminal. Syndia is the major component of this system; Syngra acts as an interface between Syndia and the SUDS2 graphics editor. Syndia performs no ambiguity or consistency checks on the BNF input. This report assumes that the reader is familiar with BNF and syntax diagram representations of grammars. (Author)

AD-A075 552/0 PC **A03**/MF **A01**
Maryland Univ College Park Computer Science Center

Workshop on Image Modelling Held at Chicago, Illinois on 6-7 August 1979.
Final rept.,
Azriel Rosenfeld. 31 Aug 79, 39p
Contract N00014-79-M-0070, Grant NSF-MCS79-04414

This Workshop was devoted to a review of the major ideas on image modelling that have been developed in the fields of image processing and analysis, as well as realted ideas that have been developed in other fields. The presentations at the Workshop emphasized general aspects, rather than problem-domain-dependent considerations. Thus the Workshop served to focus attention on the field of image modelling by providing a review of possible approaches.

ANL-79-68 PC **A02**/MF **A01**
Argonne National Lab., IL.
Production Runs on the CRAY-1.
L. Rudsinski, and G. W. Pieper. Jul 79, 21p
Contract W-31-109-ENG-38

Under a grant from the National Center for Atmospheric Research, users from several Argonne divisions executed programs on the CRAY-1. The objectives were twofold: to determine the feasibility of implementing large codes on the CRAY-1, and to decide what algorithm changes could be made to improve run time on a vector machine. In addition, it was hoped to evaluate the code produced by the new CRAY FORTRAN compiler. Large reactor codes were implemented with relative ease, requiring, for example, approximately two man-weeks to get a 56,000-card program running correctly. Certain difficulties were encountered, however, in transferring the large binary files required by a biomedical code. It is concluded that it is both feasible and desirable to implement large codes on the CRAY-1. Better instruction scheduling in the CRAY compiler reduced run times by 40 percent. With some rewriting in Assembler language to produce optimal code, the programs tested ran two to four times faster than on the IBM 370/195 or the 3033 at Argonne. Further improvement (up to two-fold) was realized in several programs by substituting new algorithms to take advantage of the vector architecture of the CRAY. 8 tables. (ERA citation 04:052396)

N79-32612/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A Fast Routine for Computing.
R. R. Jayroe, Jr. Oct 77, 22p NASA-TM-78133

A routine for calculating multidimensional histograms of multivariate data using a combination table look up and search procedure is described. The software was originally developed to compute four-dimensional histograms from LANDSAT multispectral imagery, but the concept can be used on other types of data and the program can be modified for the desired type of output information.

N79-32861/3 PC **A02**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Scientific Services.
Microprocessor as an Intelligent Interface Between Flight Data Acquisition Equipment and a Minicomputer.
J. Kruisbrink. 15 Mar 78, 16p NLR-MP-78007-U
Conf-Presented at iere Conf. On Microprocessors in Automation and Commun., Canterbury, England, 18-22 Sep. 1978.

A microprocessor (M6800) based interface was constructed for a small ground-based mobile test station. This station allows preflight inspection of aircraft-installed data acquisition equipment and postflight rough analysis of acquired flight data. The interface can link various kinds of data acquisition equipment to a minicomputer. It also selects and buffers data words from the frame organized data stream, received from the particular data acquisition equipment connected. Under control of the interface, selected data words are taken from the buffer and sent to the minicomputer. The minicomputer processes the data words to yield a plot. The main objective of the interface is to decrease the CPU-load on the minicomputer. The functional requirements for and the design and development of the interface are examined. The performance of the microprocessor program cited that can handle a continuous data stream with a word rate as high as 10 kHz, is discussed.

N79-32862/1 PC **A03**/MF **A01**
National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer.
The NPL Implementation of Level 2 of the X25 Interface.
B. E. Aldous. May 79, 29p NPL-DNACS-18/79

The implementation of level 2 of the CCITT recommendation, X25, for the interface between data terminal equipment and data circuit-terminating equipment operating in the packet mode on public data networks is described. This implementation, together with the remainder of the X25 recommendation, is for inclusion in a multi-microprocessor interface computer, built at the NPL, for conversion from the X25 interface to that employed in the European Informatics Network (EIN). Subjects covered a general overview of the complete interface computer, the EIN Matching Unit, a brief functional description of the level 2 implementation, and a detailed description of the software procedures employed.

N79-32875/3 PC **A05**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Software Design and Documentation Language, Revision 1.
H. Kleine. 1 Aug 79, 88p NASA-CR-162291, JPL-PUB-77-24-REV-1
Contract NAS7-100
Misc-Revision.

The Software Design and Documentation Language (SDDL) developed to provide an effective communications medium to support the design and documentation of complex software applications is described. Features of the system include: (1) a processor which can convert design specifications into an intelligible, informative machine-reproducible document; (2) a design and documentation language with forms and syntax that are simple, unrestrictive, and communicative; and (3) methodology for effective use of the language and processor. The SDDL processor is written in the SIMSCRIPT II programming language and is implemented on the UNIVAC 1108, the IBM 360/370, and Control Data machines.

N79-32876/1 PC **A03**/MF **A01**
Michigan Univ., Ann Arbor. Systems Engineering Lab.
Phased Models for Evaluating the Performability of Computing Systems.
L. T. Wu, and J. F. Meyer. Jul 79, 26p NASA-CR-162317, UMICH-014524-8-T
Grant NSG-1306

A phase-by-phase modelling technique is introduced to evaluate a fault tolerant system's ability to execute different sets of computational tasks during different phases of the control process. Intraphase processes are allowed to differ from phase to phase. The probabilities of interphase state transitions are specified by interphase transition matrices. Based on constraints imposed on the intraphase and interphase transition probabilities, various iterative solution methods are developed for calculating system performability.

N79-32883/7 PC **A07**/MF **A01**
Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
PROCOPES (Conversational Program for Signal Processing): Evolution Toward an Interpretative Command Language.
Master's thesis,
J. P. Boisseau. 1978, 150p ONERA-NT-1978-8
Misc-Translation Is in Process as ESA-TT-581.
In French; English Summary.

Results of work with a computer piloted signal processing system are reported. The complexity of the analysis instrumentation, the diversity of processings requested by the users, and the orientation toward self-service showed the necessity of implementing an evolutive, conversational system with a simple command language which, at the same time, optimizes the use of the computer central unit. The first version of PROCOPES has been operational since 1974 and, since then, its evolution has been partly guided by the remarks or needs of users. The study of a more sophisticated command language is presented. The work was carried out, on now obsolescent hardware, within the framework of signal processing based on digitization, a processing method that has become generalized with the appearance of new hardware, such as array processors associated with minicomputers of the new generation. Two examples of the use of this command language are presented. The interest of integrating this tape of language into present-day hardware is discussed.

N79-32884/5 PC **A04**/MF **A01**
National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer.
A Brief Guide to NPL Algorithms Library, 1979.
J. R. A. Cooper. Jan 79, 63p NPL-CSU-3/79

The NPL Algorithms Library aims to provide a collection of routines to perform the basic numerical processes required by computer users working in scientific disciplines. The library offers to external organizations, particularly British industry and commerce, government departments, and academic establishments, a simple means of drawing upon the expertise in computational mathematics available at NPL. This expertise has accumulated over many years through research and problem solving in a wide range of numerical topics. The NPL Algorithms Library contains extensive capabilities for solving linear algebraic equations and eigenproblems, optimizing general functions of many variables, fitting curves and surfaces to numerical data, and representating graphically functions and data. Many useful routines are also available for solving ordinary and partial differential equations, evaluating special functions, solving integral equations, integrating and interpolating functions, and analyzing numerical data.

N79-32885/2 PC **A16**/MF **A01**
National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer.
Definition and Verification of Computer Network Protocols.
Master's thesis,
N. V. Stenning. Feb 79, 359p NPL-DNACS-15/79
Subm-CO-Sponsored by Sys. Designers LTD.

The definition and verification of computer network protocols, with emphasis on those used for communication at the inter-computer and inter-process (host-host) levels are examined. The need for a formal definition and verification methodology is shown and several existing techniques are surveyed. A common example protocol enables ready comparison between the various techniques which are discussed. A programming methodology approach to protocol definition and verification, in which the protocol is defined by use of a programming language and verified by use of assertions, is given. Two detailed examples show the application of this technique, first in the case of a protocol which is used for data transfer on an established communication path, and second in the case of a protocol which is used to establish and terminate such paths (a connection control protocol).

N79-32886/0 PC **A06**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
Design of Software Tools for Microprogrammable Microprocessors.
M. Persson. 1979, 108p TRITA-NA-79-03, TRITA-CS-79-02

A software system (MICGEN) for the programming of microprogrammable microprocessors is described. This totally interactive and easily used package consists of a general field oriented assembler, a simulator generator, and a code formatting program. A hypothetical bit slice architecture is presented. This architecture is used to demonstrate the software tools. The writing and debugging of two sample microprograms show how the package can be used. A user's manual for the generation and use of the entire MICGEN system is provided.

N79-33104/7 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
On Search Performance for Conjunctive Queries in Compressed, Fully Transposed Ordered Files.
P. Svensson. 1979, 19p TRITA-NA-79-09

A file organization method, providing very high performance for a large class of associative queries, is abstractly defined. The organization may be viewed both as a development of the fully transposed file, and as a generalized sort. Its average search performance is modeled under some simplifying assumptions. Also, the model predictions are compared with measurement results obtained from a prototype system and a qualitative agreement is found. For purposes of comparison, analytical and measured cost curves for fully transposed file search are also given.

N79-33857/0 PC **A13**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Implementation on the FM-1600B Computer of a Basic Interpretator Implementacao No Computador FM-1600B de Um Interpretador Basic.
A. G. Ferreira. Jul 79, 280p INPE-1528-TDL/012 Misc-Revised.
In Portugese; English Summary.

The project and implementation of an Iterative BASIC Interpretator designed for the processing of small and simple programs on FERRANTI FM 1600 B computer are described. The system consists of a syntax analyser, an intermediate form generator, an editor and an executor.

N79-33858/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
Procedure for Extraction of Disparate Data from Maps into Computerized Data Bases.
B. G. Junkin. Oct 79, 23p NASA-RP-1048

A procedure is presented for extracting disparate sources of data from geographic maps and for the conversion of these data into a suitable format for processing on a computer-oriented information system. Several graphic digitizing considerations are included and related to the NASA Earth Resources Laboratory's Digitizer System. Current operating procedures for the Digitizer System are given in a simplified and logical manner. The report serves as a guide to those organizations interested in converting map-based data by using a comparable map digitizing system.

N79-33886/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
Application of Abstract Harmonic Analysis to the High-Speed Recognition of Images.
D. A. Usikov. Oct 79, 14p NASA-TM-75710
Contract NASW-3198
Tran-Transl. Into English of Primeniye Abstraktnogo Garmonicheskogo Analiza Dlya Bystrogo Raspozhavaniya Izobrazheniy (Moscow), Report PR-335, 1977 p 1-12. Subm-Transl. By Scientific Translation Service, Santa Barbara, Calif. Original DOC. Prep. By Academy of Sciences (Ussr), Moscow.

Methods are constructed for rapidly computing correlation functions using the theory of abstract harmonic analysis. The theory developed includes as a particular case the familiar Fourier transform method for a correlation function which makes it possible to find images which are independent of their translation in the plane. Two examples of the application of the general theory described are the search for images, independent of their rotation and scale, and the search for images which are independent of their translations and rotations in the plane.

PAT-APPL-6-054 538 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
High Speed, Glitch-Free Digital to Analog Converter.
Patent Application,
P. J. Grunberger. Filed 3 Jul 79, 14p N79-32852/2, NASA-CASE-GSC-12319-1
Subm-Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A digital to analog converter that eliminates glitches in the analog output waveform by using binary to unitary code conversion prior to summing is presented. The unsaturated emitter coupled logic that forms the converter allows a very high data conversion rate as well as improved synchronization among circuit elements.

PB80-105588 PC **A02**/MF **A01**
Massachusetts Governor's Advisory Committee on Computers and Data Processing, Boston.
Report to the Governor from His Advisory Committee on Computers and Data Processing (Massachusetts).
12 Aug 77, 12p

The Advisory Committee on Computers and Data Processing was established 10 November 1976 and since then has met eleven times to discuss specifically: the Electronic Data Processing (EDP) planning and management needs of Massachusetts; the specific data processing needs and plans of the Administration and Finance (A and F), Human Services and Public Safety Secretariats; the A and F procurement for a consolidated Data Processing Center; a proposed Bureau of Management Systems Development in A and F to oversee all EDP procurements by the State and to coordinate budgets and plans for the use of EDP by all agencies; the regulations and procedures used by the State for the procurement of EDP systems and services; and, the approach to be used by the State in the management of its EDP facilities.

PB80-801335 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Shift Registers (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Brian Carrigan. Dec 79, 227p
Supersedes NTIS/PS-78/1203, NTIS/PS-77/1090, NTIS/PS-76/1003, and NTIS/PS-75/879.

The bibliography cites research on the design, development, and application of shift registers. Studies are included on linear sequence generators, pseudorandom generators, feedback shift registers, and ferrite diode shift registers. Coding and decoding of shift registers are included. (This updated bibliography contains 218 abstracts, 11 of which are new entries to the previous edition.)

PB80-801624 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA
Logic Design (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Brian Carrigan. Dec 79, 216p
Supersedes NTIS/PS-78/1240, NTIS/PS-77/1157, NTIS/PS-76/1012, NTIS/PS-75/831, and NTIS/PS-75/029.

Research is cited on the logic design of computer hardware, computer software, and electrical networks. Studies are included on macromodular design of central processors, design of minicomputers, and the design of translator routines, interpreter routines, compilers, and programming languages. (This updated bibliography contains 215 abstracts, 8 of which are new entries to the previous edition.)

PB80-801640 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Data Compression. Volume 1. 1970-1977 (Citations from the Engineering Index Data Base).
Rept. for 1970-Nov 77,
Brian Carrigan. Dec 79, 251p
For the companion Published Search of the NTIS Data Base, see PB80-801632.

The bibliography of worldwide journal literature cites research on techniques and equipment for data compression. Reports on video communications, data management, and computer storage devices are included. (This updated bibliography contains 245 abstracts, none of which are new entries to the previous edition.)

UCID-30166(Pt.4) PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Computer Graphics by Example, Part 4. PICTURE: A Picture-Drawing Language for the TRIX/RED Report Editor.
K. O'Hair. 21 Nov 78, 34p
Contract W-7405-ENG-48

PICTURE is a set of statements for drawing diagrams that are compiled by PCOMP, the Picture COMPiler, and plotted by REDPP, the TRIX/RED PostProcessor. The PICTURE/PCOMP/REDPP system is also useful for constructing slides, viewgraphs, and movie titles. This report, written for the new PICTURE user, covers, by example, the use of the most common PICTURE statements, the intermixing of text and pictures (the TRIX/RED WINDOW command), and the TRIX PICTURE and EXAMINE dialects. The examples illustrate in detail the many direct and indirect ways the user can call PCOMP and REDPP. PICTURE, the TRIX/RED report editor, PCOMP, and REDPP are available in public files on the CDC 7600 computers of the Livermore Timesharing System (the Octopus network). 6 figures, 1 table. (ERA citation 04:052408)

Y-2184 PC **A02**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Digital Filtering Techniques for Use in Minicomputers.
C. M. Davenport. Aug 79, 24p
Contract W-7405-ENG-26

Two digital filtering techniques are presented which are suitable for small computers (20 to 32K words of main memory). Explicit FORTRAN-coded routines are presented along with example runs. Low-pass and band-pass applications are discussed. 14 figures. (ERA citation 04:052410)

9C. Electrical and Electronic Engineering

AD-A075 122/2 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
The Important Functions of Electronic Technology in Aviation and Space Technology,
Li-Ch'ien Chang. 22 May 79, 11p Rept no. FTD-ID(RS)T-0522-79
Edited trans. of Hang K'ung Chih Shih (China) n9 p24-25 1978, by J. Wing.

No abstract available.

AD-A075 128/9 PC **A03**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
Behavior of the Second Order Phase Automatic Control System,
H. D. Bettac, and K. H. Schemlovsky. 31 May 79, 31p Rept no. FTD-ID(RS)T-0621-79
Edited trans. of Nachrichtentecknik Elektronik (German D.R.) v21 n10 p361-365 1971, by Gale M. Weisenbarger.

No abstract available.

N79-32449/7 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
Electromagnetic Shielding Formulas.
E. Dahlberg. Feb 79, 41p TRITA-EPP-79-01 Misc-Addendum to TrITA-EPP-75-27.

This collection of electromagnetic shielding formulas contains simple transfer matrices suitable for calculating the quasi static shielding efficiency for multiple transverse-field and axial-field cylindrical and spherical shields. They are also useful for estimating leakage fields from long coaxial cables and the normal-incidence transmission of a plane wave through a multiple plane shield. The differences and similarities between these cases are illustrated by means of equivalent circuits and transmission line analogies. A discussion of a posible heuristic improvement on some shielding formulas is included.

N79-32467/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Optically Isolated Logarithmic Nanoammeter Capable of Floating to 5 Kilovolts.
J. C. Sturman, and J. C. Delaat. Oct 79, 22p NASA-TP-1527, E-9934

A logarithmic current-measuring instrument was developed to measure plasma coupling currents at a common mode voltage of 5 kilovolts. Positive or

negative currents can be measured from 10 to the -9th power to .001 ampere direct current. Optical isolation is used to control input switching and to provide data referenced to ground potential. Analog meter readouts as well as zero to five volt outputs are provided for peripheral data collection. Six independent channels are provided. Three measure positive currents, and three measure negative currents. Although designed for vacuum operation, it can be used equally well in air to measure low currents at high common mode voltages.

9D. Information Theory

N79-32412/5 PC **A05**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Spectral Characteristics of Convolutionally Coded Digital Signals.
D. Divsalar. 1 Aug 79, 85p NASA-CR-162295, JPL-PUB-79-93
Contract NAS7-100

The power spectral density of the output symbol sequence of a convolutional encoder is computed for two different input symbol stream source models, namely, an NRZ signaling format and a first order Markov source. In the former, the two signaling states of the binary waveform are not necessarily assumed to occur with equal probability. The effects of alternate symbol inversion on this spectrum are also considered. The mathematical results are illustrated with many examples corresponding to optimal performance codes.

9E. Subsystems

AD-A075 034/9 PC **A02**/MF **A01**
Rome Air Development Center Hanscom AFB Ma Deputy for Electronic Technology
An Analysis of the Elliptical Reflector,
Ronald L. Fante. 8 Feb 78, 6p Rept no. RADC/ETR-79-0015
Pub. in IEEE Transactions on Antennas and Propagation, vAP-27 n4 p455-459 Jul 79.

No abstract available.

AD-A075 037/2 PC **A02**/MF **A01**
Rome Air Development Center Hanscom AFB Ma Deputy for Electronic Technology
A 2.2 GHz SAW Delay Line Fabricated by Direct Optical Projection,
Jose H. Silva , Andrew J. Slobodnik, Jr. , and William J. Kearns. 1 Feb 79, 3p Rept no. RADC/ETR-79-0018
Pub. in IEEE Transactions on Sonics and Ultrasonics, vSU-26 n4 p312-313 Jul 79.

No abstract available.

AD-A075 106/5 PC **A05**/MF **A01**
Naval Research Lab Washington DC
Threader Microcomputer Antenna Controller.
Final rept.,
Leonard E. Russo. 24 Sep 79, 97p Rept no. NRL-MR-4067

The THREADER microcomputer antenna controller is the electrical interface and controller between the THREADER PDP11 and SA antenna pedestal. The antenna controller is slaved to the PDP11; however, the controller contains its own microprocessor, memory and program and can respond to a suite of complex commands. The controller responds to ASCII commands from the PDP11, sent over an RS232 line. The antenna controller also provides the software/hardware interface to a Time Code Reader for system time. The controller is configured from off the shelf hardware, and is implemented as a software program. The programmability and generality of the antenna controller make it potentially useful in other control applications. (Author)

AD-A075 136/2 MF **A01**
Yucca International Inc Scottsdale AZ
Hardware Development. Item 0004 of Microprocessor-Based Power Conditioner Controller.
Jan 79, 46p
Contract DAAK70-78-C-0117

Availability: Microfiche copies only.

This report covers effort to develop a microprocessor-based controller for the Delco 15 KW power conditioner. Continuing from the microprocessor selection, the previous task, the controller hardware was developed and tested during this task. The controller software will be developed in the next task. The controller hardware conforms closely to the controller baseline design concepts of Task 2. A variation from the baseline did occur in the converter SCR commutation sense circuitry. The existing Delco commutation sense signals will not be used by the controller breadboard. Instead, a more direct and perhaps more reliable method of sensing the converter SCR commutation will be implemented with optical couplers. This method is presented in detail in the report.

AD-A075 180/0 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Generator of Current Pulses with an Amplitude of 106 A and Stability of + or - 10-3 at a Repetition Rate of 2 Hz,
B. F. Bayanov , A. V. Il'in , V. N. Pakin , A. P. Panov , and G. I. Sil'vestrov. 12 Feb 79, 17p Rept no. FTD-ID(RS)T-0110-79
Edited trans. of Trudy Vsesoyuznogo Soveshchaniya po Uskoritelyam Zaryazhennykh Chastits(USSR) v1 p283-286 1970, by Carol S. Nack.

No abstract available.

AD-A075 182/6 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
SGD 4/4 RAD Antenna,
V. D. Kuzentsov , and V. K. Paramonov. 27 Dec 78, 15p Rept no. FTD-ID(RS)T-2238-78
Edited trans. of Vestnik Svyazi (USSR) n5 p14-16 1966, by Charles T. Ostertag, Jr.

No abstract available.

AD-A075 183/4 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Cophased Antenna Array with Electrical Scanning,
Ye. A. Anfilov , I. T. Govorkov , R. V. Gurevich , I. A. Zhuchkin , and V. D. Kuznetsov. 9 Jan 79, 8p Rept no. FTD-ID(RS)T-2235-78
Edited trans. of Patent (USSR) 190 433 2p 29 Dec 66, by Martin J. Folan.

No abstract available.

AD-A075 188/3 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Optimum Demodulator for Amplitude-Modulated FM-Subcarriers,
K. -H. Schmelovsky , and H. Boerner. 6 Jun 79, 20p Rept no. FTD-ID(RS)T-0622-79
Edited trans. of Nachrichtentechnik Elektronik (German D.R.) v22 n11 p377-379 Nov 72, by Gale M. Weisenbarger.

No abstract available.

AD-A075 200/6 PC **A04**/MF **A01**
RCA Labs Princeton Nj
Single-Oscillator Wideband VCO.
Final rept. 1 Jul 77-15 Mar 78,
D. D. Mawhinney. 1 Apr 78, 51p Rept no. PRRL-78-CR-52
Contract N00039-77-C-0271

The effort on this program was aimed at fabricating a low-voltage, high-speed VCO to cover the 11- to 18-GHz frequency range for use in a set-on VCO-type of frequency memory in place of an arrangement requiring three VCOs and a multiplexer. The most important accomplishments were: (1) The development of a low-power VCO covering the 11- to 18-GHz range using a GaAs hyperabrupt junction varactor diode and requiring a very small tuning voltage requirement; (2) The fabrication of a new type of frequency discriminator which uses the roll-off characteristic of a microwave FET; (3) Measurements leading to an understanding of the behavior of GaAs hyperabrupt varactors at high input levels. GaAs hyperabrupt varactors were produced having capacitance ratios in excess of 10:1, but less than the expected frequency tuning ranges were orginally obtained from VCOs with these hyperabrupt varactors used as the tuning diode. Special network analyzer measurements with varying levels of input drive power showed the impedance of the hyperabrupt varactors to be unusually sensitive to the incident power level resulting in a significant reduction in maximum capacitant at levels consistent with those to which the varactors are exposed in the oscillator.

AD-A075 287/3 PC **A04**/MF **A01**
Westinghouse Defense and Electronic Systems Center Baltimore Md Systems Development Div
GaAs Monolithic Microwave Subsystem Technology Base.
Interim technical rept. 15 Mar-15 Sep 78,
J. Oakes , and D. W. Maki. Jun 79, 61p Rept no. 78-0841
Contract N00014-78-C-0268, DARPA Order-3543

In the materials area, effort on this program during the first six months has been devoted to process technology development, and materials study and qualification. Equipment delays and malfunctions have limited progress however, direct implants and implants into both VPE and LPE were investigated with encouraging results. Investigation of self aligned gate FET's have shown high gate resistance and feedback capacitance, and corresponding low grain, resulting in a decision to revert to realized gate FET's. Interdigital capacitors with values up to 2 pf have been fabricated for use as tuning capacitors. A one bit phase shifter has been designed using lumped elements and Schottky barrier chip diodes. Testing was delayed however by a mask error which is being corrected. (Author)

AD-A075 480/4 PC **A04**/MF **A01**
Morgenthaler (Frederic R) Wellesley Ma
Theoretical Studies of Microstrip Antennas. Volume I. General Design Techniques and Analyses of Single and Coupled Elements.
Final rept. Apr 78-Jul 79,
Frederic R. Morgenthaler. Sep 79, 61p FAA-EM-79-11-1, TSC-FAA-79-21-1
Contract DOT-TS-15364
See also Volume 2, AD-A075 540.

Volume 1 of Theoretical Studies of Microstrip Antennas deals with general design techniques and analyses of single and coupled radiating elements. Specifically, we review and then employ an important equivalence theorem that allows a pair of vector potentials, A-bar and A-bar-star to be calculated from fields tangential to any surface enclosing all currents and charges. These potentials serve to calculate the far fields, from which radiation conductance and pattern can be obtained. For rectangular microstrip patch antennas, we develop novel approximations so as to include the effects of currents induced on the ground planes by fringing fields. Coupling between two patches sharing the same substrate and ground plane, or else employing separate ones stacked one above the other, is also considered by means of a novel approximation that helps provide physical insight with respect to field patterns, coupling between patches and the like. As an important by-product of this work, several new approxiamte formulas are obtained that very accurately predict the electrical characteristics of microstrip transmission lines of arbitrary width and substrate thickness when the dielectric constant of the substrate is also arbitrary. Volume II of this report is devoted to the analysis and synthesis of multiresonant elements with emphasis on dual-frequency operation of rectangular microstrip patch antennas with or without external matching networks. (Author)

AD-A075 540/5 PC **A03**/MF **A01**
Morgenthaler (Frederic R) Wellesley Ma
Theoretical Studies of Microstrip Antennas. Volume II. Analysis and Synthesis of Multi-Frequency Elements.
Final rept. Apr 78-Jul 79,
Frederic R. Morgenthaler. Sep 79, 48p FAA-EM-79-11-2, TSC-FAA-79-21-2
Contract DOT-TS-15364
See also Volume 1, AD-A075 480.

Volume II of Theoretical Studies of Microstrip Antennas deals with the analysis and synthesis of several types of novel multi-resonant elements with emphasis on dual-frequency operation of rectangular microstrip patch antennas with or without external matching networks. Specifically, we ana-

lyze dual resonances created within a single rectangular patch by means of appropriate dielectric loading and also those associated with a patch capacitively-coupled to either a lumped or distributed matching network. In all cases radiation is obtained from slots in the rectangular patch in combination with open-circuited edges. Rather than separately design the dual-resonating elements and matching networks and hope for efficient radiation and proper patterns at both frequencies, we favor and herein pursue an integrated synthesis which demands simultaneous fulfillment of the design goals. A synthesis approach, based upon coupled resonator theory, is also developed and applied to situations in which one resonant element is a rectangular mircostrip patch and the second element either a second patch or else a lumped or distributed matching network. Based upon these considerations, several new antenna configurations are proposed that utilize either in line or stacked element geometries. Volume I of this report deals with general design techniques and analyses of single and coupled microstrip radiating elements. (Author)

N79-32409/1 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Evaluation of the JPL X-Band 32 Element Active Array.
Final Report.
J. F. Boreham, R. B. Postal, and B. L. Conroy. 1 Aug 79, 68p NASA-CR-162297, JPL-PUB-79-69-REV-1
Contract NAS7-100
Subm-Sponsored in Part by Samso. Misc-Original Contains Color Illustrations.

Tests performed on an X-band 32-element active array are described. Antenna pattern characteristics of the array were tested in its standard operating mode as well as several degraded performance modes, including failures of 1, 2, 3, 4, 8, 16, and 31 elements. Additionally, the array was characterized with the addition of a metallic shroud, and also characterized versus rf drive level and at a single off-axis electronic beamsteered position. Characterization was performed on several of the 3/4-watt, three-stage, X-band solid-state power amplifier modules. The characterization included swept amplitude response, amplitude and phase versus temperature from -20 to +60 C, and intermodulation distortion of selected modules. The array is described and conclusions and recommendations based upon the experience and results achieved are included.

N79-32465/3 PC **A02**/MF **A01**
RCA Government Communications Systems, Camden, N. J. Advanced Technology Labs.
Device Model for FETSIM Circuit Simulation Program.
P. Ramondetta. Mar 77, 15p NASA-CR-150321
Contract NAS8-31325

A description of the MOS transistor used in the FETSIM analysis program is presented. CMOS/SOS device parameters are included. Typical device mobilities are given as well as the empirically determined constants necessary to model second-order effect conductance variations due to gate voltage and saturated drain voltage.

N79-32466/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
On the Minimization of Spherical Aberration in Spherical Reflector Antennas.
P. K. Agrawal. Aug 79, 15p NASA-TM-80140

An expression for the phase error in the aperture plane of a spherical reflector was developed. The nature of this phase error over the aperture plane is discussed, and, to illustrate the usage of the expression, examples are given.

N79-32485/1 PC **A05**/MF **A01**
Siemens A.G., Munich (Germany, F.R.). Forschungslaboratorien.
New Functionally Integrated Circuits.
Final Report.
R. Mueller. Dec 78, 78p BMFT-FB-T-78-37
Contract BMFT-NT-0619
In German; English Summary.

The design and investigation of semiconductor devices as fundamental building blocks for functionally integrated circuits are discussed. Several technologies and circuit techniques are compared with respect to packing density, delay times or time periods per logic operation, and power dissipation. Structural models as well as computer aided device models are in good agreement with measurements. The investigated examples show possibilities for circuit and application concepts, and the results serve as fundamental data for product development.

N79-32487/7 PC **A04**/MF **A01**
Plessey Co. Ltd., Towcester (England). Allen Clark Research Centre.
Millimeter Wave Low Noise Front End.
Final Report.
J. Arnold, and T. Vudali. Jul 78, 56p CD.6500636, ESA-CR(P)-1190
Contract ESTEC-3143/77-NL-AK(SC)

The design concepts, amplifier realization, and performance results obtained for the 35 db, 9.95 to 13.45 GHz band, GaAs amplifier are discussed. The 20 to 30 GHz band was investigated for future applications, such as the need for a low noise wideband amplifier centred at 11.7 GHz which form the I.F. amplifier following a diode mixer (converting from 29.25 GHz to 11.7 GHz). The as-built amplifier performed well, meeting the requirements for guaranteed bandwidth and providing at least 70% of the desired bandwidth. The dc consumption exceeded the specification limits due to a bias increase adopted to improve the gain at 14 GHz.

N79-32623/7 PC **A02**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Scientific Services.
Electronic Processing of Infrared Scanner Signals Using CCD Memory Techniques.
H. A. Vaningenschenau. 6 Oct 78, 10p NLR-MP-78031-U
Conf-Presented at 1978 Inter. Symp. On the Appl. Of Charge Coupled Devices, San Diego, Calif., 25-27 Oct. 1978. Misc-Original Contains Color Illustrations.

The design of a video quick look which electronically processes signals from an infrared linescanner for a moving-map presentation on TV display is described. The image memory for display is composed of 16-kbit dynamic charged coupled devices (CCD). These CCD memories are line addressable which is attractive in the case of line scan orientation for sensing and display. The video quick look system is described and the design of the CCD image memory is shown. An application of the video quick look is demonstrated for thermal infrared remote sensing.

N79-33396/9 PC **A04**/MF **A01**
Hughes Aircraft Co., Newport Beach, Calif. Solid State Products Div.
Design, Processing and Testing of LSI Arrays: Hybrid Microelectronics Task.
Interim Report, 28 Sep. 1978 - 27 Mar. 1979.
R. P. Himmel, S. M. Stuhlbarg, R. G. Ravetti, and P. J. Zulueta. 15 Apr 79, 67p NASA-CR-161312, FR79-92-1007
Contract NAS8-32607

Mathematical cost factors were generated for both hybrid microcircuit and printed wiring board packaging methods. A mathematical cost model was created for analysis of microcircuit fabrication costs. The costing factors were refined and reduced to formulae for computerization. Efficient methods were investigated for low cost packaging of LSI devices as a function of density and reliability. Technical problem areas such as wafer bumping, inner/outer leading bonding, testing on tape, and tape processing, were investigated.

PAT-APPL-6-076 643 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Pasadena Office, CA.
Baseband Signal Combiner for Antenna Array.
Patent Application,
M. F. Easterling, and R. A. Winkelstein. Filed 18 Sep 79, 21p N79-32408/3, NASA-CASE-NPO-14641-1
Contract NAS7-100
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method and an apparatus are disclosed for combining baseband signals from a large aperture antenna array in which none of the individual baseband signals has a sufficiently high signal-to-noise ratio. The invention provides a means whereby the baseband output signals of all but one of the receivers associated with each of the antennas are summed and used as a correlation reference for the baseband signal not contained in the summed signal. Thereby, a plurality of correlation or alignment loops is provided, each having an output signal related to the phase difference between its input baseband signal and the summed signal. The invention further provides a means for subtracting an output or error signal generated in one of the correlation loops whose baseband signal has a predetermined phase delay from all the other alignment loops, thus avoiding interaction and reflection effects in the signal combiner.

PB80-801889 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Radome Technology. Volume 2. December, 1976-November, 1979 (Citations from the NTIS Data Base).
Rept. for Dec 76-Nov 79,
William E. Reed. Dec 79, 138p
Supersedes NTIS/PS-78/1252, NTIS/PS-77/1152, NTIS/PS-76/1014, and NTIS/PS-75/847. For the companion Published Search of the Engineering Index Data Base, see PB80-801897. See also Volume 1, 1964-November, 1976, NTIS/PS-77/1151.

Reports from Federally-funded research are cited on the use of composite materials, ceramic materials, plastics, and protective coatings for radomes. Research on the design, construction, and manufacturing is included. Performance evaluations are presented which cover wave transmission, insertion loss, effect on antenna radiation patterns, rain erosion, and impact resistance. (This updated bibliography contains 131 abstracts, 13 of which are new entries to the previous edition.)

PB80-801897 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Radome Technology (Citations from the Engineering Index Data Base).
Rept. for 1970-Nov 79,
William E. Reed. Dec 79, 137p
Supersedes NTIS/PS-78/1253, NTIS/PS-77/1153, and NTIS/PS-76/1015. For the companion Published Searches of the NTIS Data Base, see NTIS/PS-77/1151 and PB80-801889.

Reports from worldwide research are cited on the use of composite materials, ceramic materials, plastics, dielectrics, and protective coatings for radomes. Research on the design, construction, and fabrication is included. Performance evaluations are presented which cover wave transmission, insertion loss, effect of antenna radiation patterns, rain erosion, and impact resistance. (This updated bibliography contains 134 abstracts, 30 of which are new entries to the previous edition.)

9F. Telemetry

AD-A075 206/3 PC **A03**/MF **A01**
Harry Diamond Labs Adelphi Md
A Fluidic Approach to the Design of a Mud Pulser for Bore-Hole Telemetry While Drilling.
Technical memo.,
Allen B. Holmes , and Stacy E. Gehaman. Aug 79, 40p Rept no. HDL-TM-79-21

Mud-pulse telemetry is a method for communicating diagnostic information from the bottom of a well to the surface while the well is being drilled. Because mud-pulse telemetry offers potential for improving the safety of hazardous offshore drilling operations, the U.S. Geological Survey has sponsored a research program at the Harry Diamond Laboratories (HDL) to investigate the feasibility of applying fluidic flow control techniques to the design of a reliable high-speed pulser valve. During these investigations, three subscale fluidic mud-pulsing circuits were tested over a wide range of drilling-fluid weights and viscosities to simulate well-bore conditions. The tests demonstrated that the unusual rheological properties of drilling mud

cause only slight changes in circuit performance. Further tests of circuit dynamic response indicate that a similar full-scale pulser will have a frequency response of 15 to 20 Hz. Analytical investigations have shown that both signal amplitude and frequency response of these test circuits may be improved through design modifications. HDL is now engaged in an ongoing effort to optimize the geometry of the subscale pulser circuit.

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

ANL-79-32 PC **A06**/MF **A01**
Argonne National Lab., IL.
Residential Energy-Consumption Analysis Utilizing the DOE-1 Computer Program.
S. K. Arentsen. Apr 79, 119p
Contract W-31-109-ENG-38

The DOE-1 computer program is used to examine energy consumption in a typical middle-class household in Cincinnati, Ohio. The program is used to compare energy consumption under different structural and environmental conditions, including various levels of insulation in the walls and ceiling, double and single glazing of windows, and thermostat setback schedules. In addition, the DOE-1 program is used to model the house under three energy distribution systems: a unit heater, a single-zone fan system with optional subzone reheat; and a unitary heat pump. A plant equipment simulation is performed to model the heating and cooling plant currently installed in the house. A simple economic analysis of life-cycle costs for the house is done utilizing the economic simulation portion of DOE-1. Utility bills over the past six years are analyzed to gain an actual energy-use profile for the house to compare with computer results. Results indicate that a 35% savings in heating load may be obtained with addition of proper amounts of insulation as compared with the house with no insulation. The installation of double glazing on windows may save close to 6% on heating load. Thermostat setbacks may result in savings of around 25% on energy consumed for heating. Similar results are achieved with regard to cooling load. Comparison of actual energy consumed by the household (from utility bills) with the computer results shows a 4.25% difference in values between the two. This small percent difference certainly strengthens the case for future use of computer programs in comparing construction alternatives and predicting building energy consumption. (ERA citation 04:050268)

BNL-50949 PC **A05**/MF **A01**
Brookhaven National Lab., Upton, NY.
Evaluation of Technological Data in the DFI and PIES Models.
N. Bhagat, M. Beller, A. Hermelee, J. Wagner, and J. Lamontagne. Apr 79, 86p
Contract EY-76-C-02-0016

This report evaluates the data used in two of the models available to the Energy Information Administration (EIA). Specifically, the study involves updating, reviewing, and documenting the technological data on primary energy conversion, transportation, distribution and end-use conversion. The major focus is upon data used in the Decision Focus, Inc. (DFI), LEAP model. This is an abbreviated version of the Gulf-Stanford Research, Inc., energy model developed to assess the potential future impacts of synthetic fuels in the US energy system. A parallel effort assesses the data used in the model commonly known as the Project Independence Evaluation System. (ERA citation 04:051768)

CONF-7606131- PC **A13**/MF **A01**
Texas Univ. at Austin. Bureau of Economic Geology.
Proceedings Gulf Coast Lignite Conference: Geology, Utilization, and Environmental Aspects. Report of Investigations No. 90.
W. R. Kaiser. 1978, 283p
Contract EX-76-X-01-7615
Symposium of Gulf Coast lignite, geology, utilization, and environmental aspects, Austin, TX, USA, 2 Jun 1976.

The Gulf Coast Lignite Conference: geology, utilization, and environmental aspects was sponsored by Bureau of Economic Geology, The University of Texas at Austin; U.S. Energy Research and Development Administration; and the National Science Foundation Research Applied to National Needs (RANN). The conference was held June 2, 3, and 4, 1976, at Austin, Texas. Twenty-nine papers from the proceedings have been entered individually into EDB and ERA. (ERA citation 04:051062)

CONF-780934- PC **A10**/MF **A01**
Oak Ridge National Lab., TN.
Report of the Proceedings of the OTEC Alternate Cycles Contractors' Information Exchange Meeting.
F. C. Chen, and J. W. Michel. Dec 78, 210p
Contract W-7405-ENG-26
OTEC alternate cycles contractors' information exchange meeting, Washington, DC, USA, 26 Sep 1978.

Separate abstracts were prepared for the seven papers presented. (ERA citation 04:051265)

DOE/EDP-0030 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Environmental Development Plan Wind Energy Conversion.
Jul 79, 34p

The Environmental Development Plan (EDP) system is designed to provide a common basis for planning, managing, and reviewing the environmental aspects of the various energy technology programs under the Department of Energy's (DOE) jurisdiction. The publication of an EDP is generally timed to precede key technology program decisions that result in program shifts from an exploratory development into the technology development or engineering development phase. The time frame covered by an EDP generally encompasses all significant decision points relating to the technology program. Projects or subprograms that are likely to result in a demonstration or commercialization within the near term are presented in detail. Projects that will need to be considered in greater detail in the next EDP update are identified. (ERA citation 04:051412)

DOE/EIA-0184/1 PC **A04**/MF **A01**
Energy Information Administration, Washington, DC.
International Energy Assessment. Analysis Report: AR/IA/79-27.
W. C. Kilgore. May 79, 75p

This paper provides a comprehensive assessment of the international energy situation between now and the year 1995 and includes the latest EIA forecasts of energy supply and demand for each region of the world. Also included are estimates of future world oil prices and a sensitivity analysis of the critical factors affecting those prices. The analysis projects that world energy consumption will rise at a rate of between 2.8 and 3.9% per year, over the forecast period, while the demand for petroleum is expected to grow at a rate of 2.0 to 3.5% per year. This growth in consumption is projected to occur during a period in which world economic activity is increasing at the rate of 3.8 to 4.6% per year, such that the estimated ratio of world energy growth to economic growth falls from its historic 1960--1976 ratio of 0.94, to a ratio of 0.71 to 0.85 over the 1976--1995 period. World oil prices are found to be highly uncertain with real prices by 1995 ranging between $16.50 and $31.50 per barrel across five projection series. The baseline price projections given in this paper assume that Iran's oil production returns to about 4 million barrels per day by the third quarter of 1979 and that current surcharges will be removed within the next year. The uncertainty on prices is shown to be even greater when one assumes either, more adverse pricing behavior on the part of OPEC, or, continued supply disturbnces such as those recently experienced in Iran. The principal tools used in the analysis are the International Energy Evaluation System (IEES) and the Oil Market Simulation (OMS) model. (ERA citation 04:048761)

DOE/TIC-10143 PC **A11**/MF **A01**
Total Environmental Action, Inc., Harrisville, NH.
Design of Residential Buildings Utilizing Natural Thermal Storage. Final Report.
D. Lewis, C. Michal, and P. Pietz. Jun 79, 238p
Contract EY-76-C-02-0016

The thermal storage capacity found in the materials of conventional building construction affect the heating and cooling requirements of buildings and the long-term efficiency of the space conditioning equipment used to meet these demands. The quantity of this natural thermal storage (NTS) can be increased through architectural design to improve overall building thermal performance and decrease the consumption of conventional fuels used for space conditioning. Improvements in performance come about when heating or cooling peak loads are reduced, when previously poorly used natural energy sources are tapped, or when conventional system efficiencies are increased. The capability of NTS materials to absorb, store and release thermal energies can be used advantageously to bring about these improvements. The technical and economic feasibility of these uses of NTS in residental construction in the north central and northeast US is examined. For many NTS applications, the percentage savings in heating and cooling are impressive, but the actual value of the energy saved is found to be insufficient to justify the incremental cost of NTS over reasonable levels of insulation and other energy strategies. NTS in the form of modified Trombe walls, when combined with energy conserving construction methods, is found to be an effective, available and marketable system. A prototypical residence incorporating this NTS system is designed for instrumentation and as a demonstration of NTS principles. Annual space conditioning costs are reduced to one-third of those found in new construction built to current codes, and less than one-fifth the costs found in typical existing homes. (ERA citation 04:048828)

DOE/TIC-10177 PC **A07**/MF **A01**
Washington State Energy Office, Olympia.
Washington Energy Extension Service Implementation Plan.
9 Dec 77, 150p
Contract EC-77-G-01-5097

A copy of the revised Washington State Energy Extension Service Implementation Plan is presented. Some specific information is presented for Seattle, Spokane, and Yakima program services and technical support. (ERA citation 04:048757)

HCP/M5250-01/1 PC **A06**/MF **A01**
Energy Conservation and Alternatives Center for Commerce and Industry, Denver, CO.
Making Cents of Your Energy Dollar. Volume 1. Energy Audit.
Jun 79, 118p
Contract EM-78-G-01-5250

This handbook is directed at conducting an energy audit and is a vehicle to establish an energy management program. It is primarily a guide to the identification and correction of inefficiencies in building energy systems and a practical handbook for energy management task forces. It may also be an aid in the training of state energy auditors and/or operational personnel/managers of schools, hospitals, and public buildings pursuant to the National Energy Conservation Policy Act of 1978. Further, it is suitable for use by para-professionals implementing the energy audit phase of the schools/hospitals/public buildings program. (ERA citation 04:051856)

HCP/M5250-01/2 PC **A07**/MF **A01**
Energy Conservation and Alternatives Center for Commerce and Industry, Denver, CO.
Making Cents of Your Energy Dollar. Volume 2. Technical Materials and References.
Jun 79, 142p
Contract EM-78-G-01-5250

In Volume 1, the handbook's core is a logical sequence of steps for conducting energy audits and the implementation and monitoring of a comprehensive energy management program. Practical energy conservation opportunities, including simple, quick-fix, low-or-no-cost options (operational and maintenance - O and M) as well as selected capital intensive energy measures (retrofit and redesign) are indicated clearly in the easy-to-use Energy Audit Checklist. It should be noted that it is the primary responsibility of the energy auditor to identify energy saving opportunities. Manage-

ment's responsibility is to follow-up on recommended O and M options. Model calculations are provided in Volume 2 for the majority of both types of conservation opportunities so that the management may compute potential savings and payback, using the results for intelligent decision making. These models have been standardized and programmed in such a way that it is possible to enter climatological data unique to particular heating and cooling zones. It must be emphasized that any energy calculation which treats building systems independently cannot give precise results. (ERA citation 04:051857)

HCP/U6241-01 PC **A04**/MF **A01**
Education Commission of the States, Denver, CO.
Status of State Energy Education Policy.
Jun 79, 51p
Contract EU-78-G-01-6241

A survey was conducted in May 1978 to determine the status of state policies and practices regarding energy education among state education agencies, state offices of energy, governors' offices, and state legislatures. Four different questionnaires were constructed and sent to designated officials of those agencies listed above in each state. A total of 208 questionnaires were mailed. Analysis of data received as of July 7, 1978 from 56% of the questionnaires was included in a preliminary report of that date. That data plus additional information received by September 1, 1978 as a result of direct follow-up since July 7 is included in this final report, which represents input from approximately 70% of the agencies surveyed. (ERA citation 04:048873)

HUD-PDR-445 PC **A08**/MF **A01**
American Planning Association, Chicago, IL.
Protecting Solar Access for Residential Development: A Guidebook for Planning Officials.
M. Jaffe, and D. Erley. May 79, 151p
Contract EX-76-A-29-1020-008

The purpose of this manual is to show planners how to use conventional land use controls to protect solar access in new residential development for space heating and cooling and domestic hot water. Protecting solar access essentially means regulating development in such a way that buildings and vegetation do not block sunlight and prevent solar energy use by neighboring buildings. In other words, protecting solar access means regulating to control shadows. While at first this may seem like a revolutionary idea, it will quickly be seen that protecting solar access is closely akin to traditional regulation to protect access to light, air, and views. This manual shows how solar access can be protected using existing authority of the police power or by private agreements. In addition to zoning, other traditional public regulations can be used to protect solar access, including subdivision regulations and environmental impact statements. Municipalities also can affect solar access in residential areas by planting street trees with an eye toward protecting solar access for the future. Finally, solar access can be protected by private agreements, usually covenants or easements, which communities often review as part of the development process. (ERA citation 04:049633)

IDO-1683-1(V.1) PC **A08**/MF **A01**
Colorado School of Mines, Golden.
Dawsonite and Nahcolite Survey. Volume 1. Reserves, Technology, Economics, and Market Assessment.
C. B. Farris, and C. J. Mains. Apr 78, 169p
Contract EC-77-S-07-1683

A survey report is presented for dawsonite and nahcolite, based on a bibliography and supplementary information obtained from researchers and mineral experts in the US. This report discusses resources, technology, economics, and market assessment from 1978 to 2000. It is estimated that in the Piceance Creek Basin of northwestern Colorado, there are approximately 27 billion tons of dawsonite and 30 billion tons of nahcolite, codeposited with portions of a vast oil shale deposit. All areas where the saline minerals and oil shale have been codeposited are controlled by the Federal government, with three exceptions. It is currently believed that all other oil shale properties lack recoverable quantities of dawsonite and/or nahcolite. Dawsonite and its derivatives can be used in the alumina, aluminum, catalyst, plastics, and water-treatment industries. Only the alumina and aluminium are large enough to absorb potential production by 2000. Nahcolite and its derivatives can be used in the flue gas scrubbing, glass, soda ash, and potentially dawsonite-recovery industries. Only flue gas scrubbing is likely to be a sufficiently large outlet to absorb potential nahcolite production by 2000. (ERA citation 04:051127)

IDO-1683-1(V.2) PC **A06**/MF **A01**
Colorado School of Mines Research Inst., Golden.
Dawsonite and Nahcolite Survey. Volume 2. Dawsonite and Nahcolite Bibliography with Abstracts.
C. B. Farris, and E. H. Leland. Apr 78, 112p
Contract EC-77-S-07-1683

The Dawsonite and Nahcolite Survey included a world-wide literature search. This volume comprises a bibliography, with abstracts included for each citation, representing the results of that search. The author's abstract was used directly if it was included as part of a paper. In many cases, however, these abstracts were too general for the purposes of this study and the author's abstract was expanded. In some cases, the author's abstract was edited to highlight dawsonite and nahcolite aspects. Foreign-language papers were translated only sufficiently to determine their relevance to the Piceance Creek mineral depsits. Generally, these papers reported on foreign deposits and were of limited value. Abstracts are categorized into the following subjects: general, geology and mineralogy, reserves and exploration, mining and processing, properties and their determination, environmental, uses, and competing alumina raw materials and processes. (ERA citation 04:051128)

N79-33561/8 PC **A03**/MF **A01**
Wyle Labs., Inc., Huntsville, Ala.
Indoor Test for Thermal Performance of the Sunmaster Evacuated Tube (Liquid) Solar Collector.
Sep 79, 40p NASA-CR-161306, WYLE-TR-531-30R
Contract NAS8-32036
Subm-Prepared for Doe.

The test procedures used to obtain the thermal performance data for a solar collector under simulated conditions are presented. Tests included a stagnation test, a time constant test, a thermal efficiency test, an incident angle modifier test, and a hot fill test. All tests were performed at ambient conditions and the transient effect and the incident angle effect on the collector were determined. The solar collector is a water working fluid type.

N79-33568/3 PC **A03**/MF **A01**
Wyle Labs., Inc., Huntsville, Ala. Solar Energy Systems Div.
Indoor Test for Thermal Performance of the Ge TC-100 Liquid Solar Collector Eight- and Ten-Tube Configuration.
Sep 79, 47p NASA-CR-161305, WYLE-TR-531-36R
Contract NAS8-32036
Subm-Prepared for Doe.

The thermal performance of a liquid solar collector was tested in eight- and ten-tube configurations under simulated conditions. A time constant test and an incident angle modifier test were also conducted to determine the transient and incident angle effects on the collector. Performance loss with accessory covers is demonstrated. The gross collector area is about 17.4 ft sq without manifold and 19.1 ft sq with manifold. The collector weight is approximately 60 pounds empty and 75 pounds with manifold.

N79-33570/9 PC **A02**/MF **A01**
Owens-Illinois, Inc., Toledo, Ohio.
Owens-Illinois Subsystem Design Package for the Sec-601 Air-Cooled Solar Collector.
Feb 79, 19p NASA-CR-161094
Contract NAS8-32259
Subm-Prepared for Doe.

The subsystem design of the SEC-601 solar collector was evaluated. The collector is of modular design and is approximately 12 feet three inches wide and eight feet seven inches tall. It contains 72 collector tube elements and weighs approximately 300 pounds. Included in this report are the subsystem performance specifications and the assembly and installation drawings of the solar collectors and manifold.

N79-34074/1 PC **A02**/MF **A01**
ESC Energy Corp., Daly City, Calif.
Distribution Automation and Control Support; Analysis and Interpretation of DAC Working Group Results for Use in Project Planning.
P. Klock, and D. Evans. Apr 79, 16p NASA-CR-162331
Contract JPL-955231

The Executive Summary and Proceedings of the Working Group Meeting was analyzed to identify specific projects appropriate for Distribution Automation and Control DAC RD&D. Specific projects that should be undertaken in the DAC RD&D program were recommended. The projects are presented under broad categories of work selected based on ESC's interpretation of the results of the Working Group Meeting. Some of the projects are noted as utility industry projects. The ESC recommendations regarding program management are presented. Utility versus Government management responsibilities are noted.

ORNL/EIS-152 PC **A11**/MF **A01**
Oak Ridge National Lab., TN.
Industrial Energy Use: A Selected Bibliography.
A. R. Ehrenshaft, B. Y. Barber, P. J. Carroll, J. M. Fielden, and L. K. Plemons. Jul 79, 241p
Contract W-7405-ENG-26

The industrial and agricultural sectors account for approximately 40% of the total energy consumption in the United States. As a companion volume to the Industrial Energy Use Data Book, which will be published in the fall of 1979, this bibliography contains references dealing with the following energy-intensive industrial classifications: chemicals and allied products; primary metal industries; paper and allied products; stone, clay, glass, and concrete products; food and kindred products; construction; agriculture; fabricated metal products; transportation equipment; textile mill products; mining; machinery, except electrical; petroleum and coal products; and electric and electronic equipment. Also included are references on energy production, supplies, and reserves; the environmental impact of processing technologies; and government policies and legislation which affect end-use consumption. All references are keyworded and arranged alphabetically by author or by corporate author if individual authors are not cited in the document. Author, corporate author, sponsor, report number, keyword, and permuted title indices are provided. (ERA citation 04:051867)

ORNL/TM-6666 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Fossil Energy Program. Progress Report for October 1978.
L. E. McNeese. Jan 79, 65p
Contract W-7405-ENG-26

This report - the fifty-first of a series - is a compendium of monthly progress reports for the ORNL research and development programs that are in support of the increased utilization of coal and other fossil fuel alternatives to oil and gas as sources of clean energy. The projects reported this month include those for coal conversion progress development, material engineering, alkali metal vapor topping cycles, a coal equipment test program, an AFB coal combustor for cogeneration (CCC), engineering and support studies, process and program assistance, environmental assessment studies, magnetic beneficiation, and AFBC demonstration plant. (ERA citation 04:050929)

ORNL-5520 PC **A13**/MF **A01**
Oak Ridge National Lab., TN.
Fossil Energy Program. Quarterly Progress Report for the Period Ending December 31, 1978.
L. E. McNeese. Apr 79, 280p
Contract W-7405-ENG-26

This quarterly report covers the progress during the period October 1 through December 31 for the

Oak Ridge National Laboratory research and development projects carried out in support of the increased utilization of coal and other fossil fuel alternatives to oil and gas as sources of clean energy. These projects are supported by the DOE Divisions of Fossil Fuel Processing, Fossil Fuel Utilization, Fossil Fuel Extraction, Systems Engineering, Basic Energy Sciences, and Health and Environmental Research, and by the EPA Office of Research and Development through interagency agreement with the DOE. (ERA citation 04:050928)

PB80-105620 PC **A09**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Symposium on Energy and Road Transport. Proceedings of a Symposium, Held at the Transport and Road Research Laboratory, Crowthorne, on 12-13 April, 1976.
c1979, 184p TRRL-SUPPLEMENTARY-447
Also pub. as ISSN-0305-1315.

The meeting considered three aspects of these extremely important topics - energy supply and demand, energy economy for cars and lorries using petrol and other liquid fuels, and alternative types of road vehicles, particularly those powered by electric batteries. (Copyright (c) Crown Copyright 1979.)

PB80-106172 PC **A04**/MF **A01**
Syracuse Research Corp., NY. Energy Research Center.
Weatherization Training: A Notebook for Weatherization. Supplement Number 4,
Arthur Levy, Benton Hoskins, James Schofield, David Florey, and Laurence Reynolds. Apr 79, 59p SRC-TR-77-555.123, CSA/LN-2426
Grant CSA-30200-L-76-01
See also Supplement No. 3, PB-301 143.

Topics in this supplement include the use of the CETA program to develop energy conservation projects, advice on reducing liability in a weatherization business, and employment opportunities for weatherization workers.

PNL-2995 PC **A04**/MF **A01**
Battelle Human Affairs Research Centers, Seattle, WA.
Comparative Analysis of Network Television News Coverage of Nuclear Power, Coal, and Solar Stories.
W. L. Rankin, and S. M. Nearley. Feb 79, 56p
Contract EW-78-C-06-1076

The purpose of this research was to analyze national television news coverage of nuclear power, coal power, and solar power issues to help gain an understanding about the information being presented about energy technologies that has been shaping public attitudes. ABC, CBS, and NBC news broadcasts from 1972 through 1977 were analyzed. A summary of the findings is presented. (ERA citation 04:051435)

SAND-78-7022 PC **A05**/MF **A01**
Boeing Engineering and Construction, Seattle, WA.
Linear Concentrating Solar Collector in an Air-Supported Enclosure Preliminary Design Study. Final Report.
J. H. Laakso, and D. K. Zimmerman. Mar 79, 93p
Contract EY-76-C-04-0789

A preliminary design for a low-cost linear parabolic concentrating solar collector in a pneumatically stabilized cylindrical plastic film enclosure and analyses of its theoretical performance and projected costs are described. Potential applications for the concentrator are in heating fluids to the mid-temperature range for use in industrial process heating. The study objective was to develop an inovative design concept having pneumatically stabilized plastic film enclosure as an approach to achieving low collector cost. Both circular film and rigid parabolic reflector concepts were investigated; the concept fulfulling the study objective has a lightweight aluminum honeycomb sandwich parabolic trough reflector with an aluminized polyester film reflective surface. The reflector panels and a black-chrome plated carbon steel absorber tube are supported at intervals by rings with spokes. Cylindrical film enclosure sections are attached to the rings which are supported by rollers; this assembly rotates about the fixed absorber tube and is driven by an electric gearmotor and microprocessor-based control system. Key design features for a collector with a weatherized polyester enclosure 2.8 m diameter by 30.5 m long (9.33 by 100 ft.) and an aperture area of 69.3m exp 2 (745.9 ft exp 2) are given. For this collector configuration, structural analyses, thermal performance modeling, mass-produced component costs, field assembly methods and maintenance requirements are discussed. Daily efficiencies in excess of 45% are predicted with estimated installed field collector costs of $90/m exp 2 ($8.34/ft exp 2). Results of cost and performance studies indicate that the collector has potential for low cost and offers attractive cost/performance figures-of-merit with further development. (ERA citation 04:051323)

SAND-79-0514 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Performance Testing of the General Electric Engineering Prototype Collector.
V. E. Dudley, and R. M. Workhoven. Jul 79, 35p
Contract EY-76-C-04-0789

Results of tests on the General Electric Engineering Prototype Collector, a 5-meter parabolic dish solar concentrator, are provided. This collector is a first prototype for a solar total energy system proposed for a knitwear plant in Shenandoah, Georgia. (ERA citation 04:051324)

SERI/TP-49-183 PC **A09**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Retrofit '79.
1979, 197p CONF-790206-
Contract EG-77-C-01-4042
Biomass gasification workshop, Seattle, WA, USA, 2 Feb 1979.

In addition to a compilation of the talks presented, summaries are given of panel discussions on the commercialization of air gasifiers and on the research needs in this area. Suggestions made in response to a letter asking what government actions were needed to promote commercialization of air gasification are summarized. A directory is given of air biomass gasifiers in the US and Canada and their status (research, pilot scale, commercial, etc.). Separate abstracts were prepared for eight papers. (ERA citation 04:051262)

SERI/TP-52-138 PC **A03**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Role of the Government in the Development of Solar Energy.
M. D. Yokell. 1979, 30p CONF-790122-3
Contract EG-77-C-01-4042
Annual meeting of the American Association for the Advancement of Science, Houston, TX, USA, 3 Jan 1978.

The economic rationale for a federal solar energy subsidy program, the type of program required, and methods for determining the proper funding level for each program are discussed. An introduction offers a brief description of solar technologies. A summary of the current federal solar subsidy program is also provided. Nonsubsidy programs, such as the promulgation of federal standards for solar manufacturers, are not discussed. (ERA citation 04:048266)

SERI/TR-62-069 PC **A08**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Solar Energy Legal Bibliography. Final Report.
D. Seeley, B. Euser, C. Joyce, G. H. Morgan, and J. G. Laitos. Mar 79, 169p
Contract EG-77-C-01-4042

The Solar Energy Legal Bibliography is a compilation of approximately 160 solar publications abstracted for their legal and policy content (through October 1978). Emphasis is on legal barriers and incentives to solar energy development. Abstracts are arranged under the following categories: Antitrust, Biomass, Building Codes, Consumer Protection, Environmental Aspects, Federal Legislation and Programs, Financing/Insurance, International Law, Labor, Land Use (Covenants, Easements, Nuisance, Zoning), Local Legislation and Programs, Ocean Energy, Patents and Licenses, Photovoltaics, Solar Access Rights, Solar Heating and Cooling, Solar Thermal Power Systems, Standards, State Legislation and Programs, Tax Law, Tort Liability, Utilities, Warranties, Wind Resources, and General Solar Law. (ERA citation 04:048267)

SERI/TR-62-204 PC **A04**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Selected Legal and Institutional Issues Related to Ocean Thermal Energy Conversion (OTEC) Development.
V. P. Nanda. Jun 79, 54p
Contract EG-77-C-01-4042

Ocean Thermal Energy Conversion (OTEC), an attractive alternative to traditional energy sources, is still in the early stages of development. To facilitate OTEC commercialization, it is essential that a legal and institutional framework be designed now so as to resolve uncertainties related to OTEC development, primarily involving jurisdictional, regulatory, and environmental issues. The jurisdictional issues raised by OTEC use are dependent upon the site of an OTEC facility and its configuration; i.e., whether the plant is a semipermanent fixture located offshore or a migrating plant ship that provides a source of energy for industry at sea. These issues primarily involve the division of authority between the Federal Government and the individual coastal states. The regulatory issues raised are largely speculative: they involve the adaptation of existing mechanisms to OTEC operation. Finally, the environmental issues raised center around compliance with the National Environmental Policy Act (NEPA) as well as international agreements. 288 references. (ERA citation 04:048268)

SERI/TR-62-255 PC **A07**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Regulated Utilities and Solar Energy: A Legal-Economic Analysis of the Major Issues Affecting the Solar Commercialization Effort.
J. Laitos, and R. J. Feuerstein. Jun 79, 131p
Contract EG-77-C-01-4042

The reaction of public utilities to the addition (and competitive) sources of energy supplied by solar technologies will have a significant impact on the commercialization of solar energy. Decentralized applications of solar energy need utility-produced power to back up the energy produced by solar means. The cost and availability of this power will largely determine the acceptance of solar energy. There are three legal issues surrounding the role of utiilties in the solar commercialization effort: (1) the extent to which utilities may own, sell, lease, finance, or service solar devices for utility customers; (2) the degree to which solar-powered utilities may be able to compete with existing utilities; and (3) the degree to which various utility rate structures will be allowed to penalize decentralized solar users. The impact of state constitutional and statutory provisions upon these issues is examined, along with relevant federal constitutional doctrines. Finally, the statutes of the National Energy Act, many of which specifically address the above issues, are discussed. (ERA citation 04:048269)

UCID-18037-79-2 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Federal Laboratory Consortium for Technology Transfer. Far West Region Local Government Assistance Task Force. Second Progress Report.
C. F. Miller, and A. A. Sjoholm. Mar 79, 45p
Contract W-7405-ENG-48

The Far West Region of the Federal Laboratory Consortium is currently conducting a demonstration project on the needs and problems of local government administrators due to the passage of Proposition 13. This project, the Local Government Assistance Task Force, has been designed to assess the changes in city and county needs resulting from the post-13 budget cuts and to test various methodologies by which the Federal Laboratory Consortium can increase the level of assistance it is providing. The Second Progress Report describes the purposes and goals of the Task Force, the activities that have evolved in support of those goals, and the current status of the specific projects undertaken at the request of administra-

tors in the test jurisdictions, the Cities of San Diego and Berkeley and the County of San Diego. Special emphasis is given to the Energy Link Project and the Stress Disability Retirement Project. The efforts underway in these test sites are expected to be of benefit throughout the nation. New applications of current technology and new methods of transferring technology are being developed here that can be used in other jurisdictions. Periodic reports and presentations are scheduled that will disseminate the results of the Task Force effort. (ERA citation 04:050159)

UCRL-52687 PC **A05**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Oil Shale Resource Assessment for In Situ Retorting, Phase 1: Piceance Creek Basin, Colorado.
R. H. Carpenter, D. W. Gentry, and G. L. Krum. 22 Mar 79, 79p
Contract W-7405-ENG-48

It was decided that the resource potential could best be shown by delineating zones or areas that contained a given thickness of oil shale at various grades. Thicknesses in multiples of 400 ft were chosen for the assessment. Oil shale grades were contoured for specific thickness intervals. The study suggested that the Piceance Creek Basin has a large resource base, with physical dimensions and qualities amenable to in situ processing. A conservative estimate revealed some 384 billion barrels of oil in thickness intervals of greater than or equal to 400 ft and some 309 billion barrels in thicknesses of greater than or equal to 1600 ft. These calculations of the resource base may represent only a fraction of the total within the basin. (ERA citation 04:051129)

UCRL-52754 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Energy System in the Far West: Impacts of the National Energy Act of 1978.
B. Hammond, T. Bradshaw, and D. Dorn. 6 Apr 79, 46p
Contract W-7405-ENG-48

This report provides information on the impact of the National Energy Act of 1978 (NEA) on state energy systems in Federal Region IX (Arizona, California, Hawaii, and Nevada). It includes data on the demographic and economic character of the region; a state-by-state analysis of the way the act will affect the major firms and government regulatory agencies involved in the production, distribution, and exchange of energy; an overview of the impact of the NEA on each energy industry in the region; and a discussion of the act's impact on interstate linkages and the reliability of energy supplies. The basic conclusion is that the NEA will serve to encourage actions already being taken by many of the utilities, but that it will not effect major changes in existing patterns of energy use. (ERA citation 04:051803)

UCRL-52788 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
New Factors Influencing the Development of Free-World Oil Resources.
I. Y. Borg. 6 Jun 79, 45p
Contract W-7405-ENG-48

In the past, oil production trends have not always been an accurate indicator of exploration success and development potential. Foreign producers, particularly, have been affected by disruptive situations independent of the geology of their fields - revolutions, wars, and embargoes. These old factors continue to affect production. However, new nongeological factors are having an increasingly potent impact on crude oil supplies worldwide: capricious cut-backs to ensure high prices, conservation practices designed to preserve the unique and finite resources of individual countries, a shift in many oil-rich countries to the export of petroleum products rather than crude oil, a change in the share of heavy oils on world markets (significant because of the inability of some importing countries to utilize them), delays in outer-continental-shelf leasing schedules and related exploration in the US, land withdrawals in the US, and implementation of US legislation such as the Clean Air Act Amendments of 1977, which can prohibit development in pristine areas. Individually, these new phenomena tend to delay rather than forestall development of the world's crude oil; however acting together or with other factors such as political upheavals and natural catastrophes, they can cause or aggravate supply/demand imbalances. As the world supply is depleted, the importance of these nongeological factors promises to increase. (ERA citation 04:051115)

10B. Power Sources

AD-A075 245/1 PC **A04**/MF **A01**
Naval Ocean Systems Center San Diego Ca
AN/URT-23A(V) Power Supply Feasibility Study.
Final technical and evaluation rept.,
C. W. Rosengrant. Mar 79, 53p Rept no. NOSC/TR-428

This report was prepared as part of a study to develop an advanced communications center for the SSN(X) submarine. The objective was to determine the feasibility of replacing or modifying the 400-Hz power supply of the URT-23A(V) high frequency transmitting set to permit operation from 60-Hz power without the external power supply. The feasibility of powering the transmitter set with the same power supply and dc or 400-Hz sources was also of concern. Block diagrams of the 60- and 400-Hz power supply configurations were created and used in studying the power requirements of the transmitter set. Power requirements and consumption estimates were made for the major functions of the transmitter set. This information was used in paper designs for two switching mode power supplies and the inverter power supply. These designs were used in the selection of parts that would satisfy the design parameters. The dimensions of the selected parts were used in estimating the volume of a hypothetical power supply configuration. Results indicate that it is possible to replace the 400-Hz power supply in the rf amplifier with a power supply that increases the height of the rf amplifier by 2.2 inches, operates from dc, 60- or 400-Hz power, and opens up 70 cubic inches in the rf amplifier for future growth. The report recommends that the feasibility of the proposed supply design be demonstrated by building a breadboard model that can operate from DoD-STD-1399, section 300 shipboard power and satisfy the power requirements of the transmitter set. (Author)

AD-A075 372/3 PC **A04**/MF **A01**
Uop Inc des Plaines Il Corporate Research Center
Optimization of Pt-Doped KOCITE (Trade Name) Electrodes in H3PO4 Fuel Cells.
Final technical rept. Sep 78-May 79,
L. B. Welsh , and R. W. Leyerle. Aug 79, 73p Rept no. TR-6
Contract DAAG53-76-C-0014

The use of UOP Inc. Kocite (R*)-derived electrocatlysts as low-cost air and/or fuel electrocatalysts in phosphoric acid electrolyte fuel cells has been optimized with respect to some of the electrocatlyst and electrode structure parameters. Kocite-derived electrocatalysts are made from Kocite R* materials, which are composite structures consisting of pyropolymers chemically bonded to refractory substrates. Fuel cell electrodes are fabricated from these electrocatalysts and normally tested as anodes and cathodes in model fuel cells. (Author)

AD-A075 609/8 PC **A02**/MF **A01**
Army Electronics Research and Development Command Fort Monmouth Nj Electronics Technology/Devices Lab
Militarized Thermoelectric Power Sources.
Technical rept.,
G. Guazzoni , A. Herchakowski , and J. Angello. Jul 79, 9p Rept no. DELET-TR-79-17

Thermoelectric power sources are being developed to provide multifuel, silent, maintenance free tactical power generators for forward area applications. Recent technology improvements, state of development, and performance characteristics of the 100-Watt and 500-Watt Thermoelectric Power Sources are presented. (Author)

AED-Conf-78-212-016 PC **A02**/MF **A01**
Boeing Engineering and Construction, Seattle, WA.
Central Receiver Design Considerations for Brayton Cycle Solar Power Plants.
J. R. Gintz, and R. C. Zentner. 1978, 21p CONF-780425-13
Symposium on solar-thermal power stations, Cologne, F.R. Germany, 12 Apr 1978.
U.S. Sales Only.

A concept for a Central Solar Power Plant utilizing gas turbine machinery for the power conversion cycle is briefly described. The design requirements, design rationale, thermal performance and technical feasibility of the receiver system are discussed. The selection of a cavity receiver concept and initial receiver configurations were the result of analysis. The final configuration selected included consideration of materials availability and manufacturing cost as a criteria. In this process, candidate materials to satisfy the design requirements for a commercial sized receiver were selected and evaluated. Some testing was conducted to verify the material selection. (ERA citation 04:036081)

ANL/MHD-78-5 PC **A08**/MF **A01**
Argonne National Lab., IL.
Liquid-Metal MHD Energy Conversion. Status Report, March 1976–September 1977.
M. Petrick, P. F. Dunn, E. S. Pierson, P. V. Dauzvardis, and I. Pollack. May 79, 156p
Contract W-31-109-ENG-38

A new open-cycle coal-fired liquid-metal MHD concept has been developed, in which the combustion products are mixed directly with liquid copper and the mixture is then passed through the MHD generator. This concept yields a system with an efficiency comparable to that of open-cycle plasma MHD at combustor temperatures as much as 1000 K lower and MHD generator temperatures more than 1000 K lower than is the case for open-cycle plasma MHD. Significantly, the liquid-metal system uses components that are close to or within present-day technology, and it appears that readily available containment materials are compatible with the fluids. The first commercial system studies for the liquid-metal Rankine-cycle concept show that it yields a higher conversion efficiency than conventional steam cycles for lower-temperature heat sources, such as a liquid-metal fast-breeder reactor, a light-water reactor, or solar collectors without any potential for hazardous reactions betweeen liquid metals (e.g., sodium) and water. Fabrication of the high-temperature liquid-metal MHD facility has been completed, and shakedown runs have been performed, using a substitute mixer-generator test section. Data obtained in this test section agreed well with existing single-phase and newly-developed two-phase correlations for the pressure gradient. (ERA citation 04:051835)

COO-4094-25 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Classification and Technical Review of DC-AC Inverters for Use in Photovoltaic Power Systems.
E. E. Landsman. 30 Apr 79, 37p
Contract EY-76-C-02-4094

A classification system is presented for stand-alone and utility-interactive dc-to-ac inverters used in photovoltaic systems in the 1-to-100-kVA power range. Additional inverter topologies, noted during the classification process, are introduced. To provide background, generally used dc-to-ac inversion technology is reviewed. Relative merits and liabilities of available power devices are discussed and device protective techniques are reviewed. Maximum power point tracking can enhance system value in utility-interactive no-battery photovoltaic power systems. This general theory is reviewed and an improved implementation is described. (ERA citation 04:051265)

DOE/ET-0078/T1 PC **A07**/MF **A01**
Department of Energy, Washington, DC. Office of Solar, Geothermal, Electric and Storage Systems.
Solar Thermal Power Systems. Annual Technical Progress Report, FY 1978.
Jun 79, 144p

A technical progress report on the DOE Solar Thermal Power Systems Program is given. Emphasis is on the technical progress of the projects rather than on activities and individual contractor

efforts. Each project description indicates its place in the prior to FY 1978 is given; the significant achievements and real progress of each project during FY 1978 are described; and future project activities as well as anticipated significant achievements for each project are forecast. (ERA citation 04:051268)

DOE/ET/4053-78/1 PC **A03**/MF **A01**
Booz-Allen and Hamilton, Inc., Bethesda, MD.
Economic Incentives to Wind Systems Commercialization. Final Report.
M. Lotker, R. W. Shaw, Jr., W. F. Adolfson, R. P. Bernardi, and P. H. Davidoff. Aug 78, 36p
Contract EG-77-C-01-4053

This assessment of Economic Incentives to Wind Systems Commercialization is an analysis of the quantitative and qualitative impacts of a variety of Government funded economic incentives on Wind Energy Conversion Systems (WECS). The purpose of this study is to achieve better understanding of the relationship between implementation of specific economic incentives for WECS, and the factors surrounding WECS commercial introduction. (ERA citation 04:051411)

DOE/JPL-1012-78/2 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Photovoltaic Solar Panel Resistance to Simulated Hail. Low-Cost Solar Array Project.
D. Moore, and A. Wilson. 15 Oct 78, 34p
Contract EX-76-A-29-1012

As part of the Jet Propulsion Laboratory's Low-Cost Solar Array Project, test methods have been evaluated and procedures developed for testing photovoltaic flat-plate solar cell modules for resistance to impact by hailstones. Testing has included the use of simulated hailstones (frozen ice spheres projected at terminal velocity), steel balls, and other projectile types applied with three loading methods: pneumatic gun, gravity drop, and static loading. Results are presented that compare the advantages and disadvantages of the three test methods. Dropped-steel-ball tests are shown to exhibit little correlation with high-velocity ice-ball tests, whereas statically-loaded steel balls show a somewhat better correlation with ice-ball tests. Results are also presented on the hail impact strength of 16 flat-plate photovoltaic modules. The module designs tested have been shown to be capable of withstanding as large as 1-1/2-inch diameter and not capable of withstanding as small as 1/2-inch diameter simulated hail. The top surface material of the modules has a dominant influence on the hail impact resistance of the modules. In order of increasing impact strength for a given thickness, the top surface materials encountered in the modules tester were: clear silicone rubber, annealed glass, tempered glass, and acrylic sheet. The critical failure mechanism of each module type is explored and means for improving the hail resistance of future modules are described. (ERA citation 04:051233)

DOE/JPL/954343-13 PC **A04**/MF **A01**
Lamar Univ., Beaumont, TX. Dept. of Chemical Engineering.
Process Feasibility Study in Support of Silicon Material Task 1. Quarterly Technical Progress Report (XIII), September--December 1978.
K. Y. Li, K. C. Hansen, and C. L. Yaws. Dec 78, 69p
Contract NAS-7-100-954343

Major activities during this reporting period centered on process system properties, chemical engineering and economic analyses. Analyses of process system properties was continued for materials involved in the alternate processes under consideration for solar cell grade silicon. The following property data are reported for trichlorosilane: critical constants, vapor pressure, heat of vaporization, gas heat capacity, liquid heat capacity, density, surface tension, viscosity, thermal conductivity, heat of formation of Gibb's free energy of formation. Major efforts were expended on completion of the preliminary economic analysis of the UCC Silane Process (Union Carbide Corporation Silane Process). Cost, sensitivity and profitability analysis results are presented based on a preliminary process design of a plant to produce 1,000 metric tons/year of silicon by the revised process. Fixed capital investment estimate for the plant is $9.19 million (1975 dollars). Product cost without profit is 6.90 $/kg of silicon (1975 dollars). The profitability results indicate a sales price of 9.88 $/kg of silicon (1975 dollars) at a 20% DCF return on investment after taxes. Major chemical engineering activities were started on the modified BCL process which includes additional data and engineering modification. The preliminary process design was initiated including specific base case conditions, reaction chemistry, process flow diagram and material balance for a plant to produce 1,000 Mt/yr of solar cell grade silicon. (ERA citation 04:051234)

DOE/JPL/954521-7 PC **A03**/MF **A01**
Spire Corp., Bedford, MA.
Integral Glass Encapsulation for Solar Arrays. Quarterly Progress Report No. 8.
Oct 78, 29p
Contract NAS-7-100-954521

This is the eighth quarterly report under a program to develop integral glass encapsulation of terrestrial solar arrays through electrostatic bonding. The goal of this program is to develop bonding techniques and module designs demonstrating a low-cost encapsulation system that will provide protection of solar arrays for periods of 20 years or more. Electrostatic bonding is a technique for encapsulating solar cells of silicon and other materials in glass. No adhesives or secondary encapsulants are required. Bonding is a rapid process accomplished in only a few minutes and ideally suited for automated, in-line processing. Economic analyses have shown that this method of encapsulation is cost-effective, and will meet the 1986 LSA price goals. Several module designs incorporating electrostatic bonding have been demonstrated. Two fundamental configurations have been defined and proven. Common to both is an integral glass front superstrate assembly. This part may be coated with any of several conventional backings to provide a very low cost system. For ultimate protection and extended array lifetime, a back glass may be hermetically sealed to the front by electrostatic bonding. Accelerated environmental testing of both of these systems has proven their reliability. Status of the program is reported. (ERA citation 04:051235)

DOE/JPL/954589-7 PC **A05**/MF **A01**
Westinghouse Electric Corp., Trafford, PA. Power Circuit Breaker Div.
Low Cost Solar Array Project, Silicon Materials Task. Development of a Process for High Capacity Arc Heater Production of Silicon for Solar Arrays. Quarterly Technical Report, July--September 1978.
1978, 97p
Contract NAS-7-100-954589

A program has been established at Westinghouse to develop a high temperature silicon production process using existing electric arc heater technology. Silicon tetrachloride and a reductant (sodium) will be injected into an arc heated mixture of hydrogen and argon. Under these high temperature conditions, a very rapid reaction is expected to occur and proceed essentially to completion, yielding silicon and gaseous sodium chloride. Techniques for high temperature separation and collection of the molten silicon will be developed using standards engineering approaches, and the salt vapor will later by electrolytically separated into its elemental constituents for recycle. Preliminary technical evaluations and economic projections indicate not only that this process appears to be feasible, but that it also has the advantages of rapid, high capacity production of good quality molten silicon at a nominal cost. The status of the program is described. (ERA citation 04:051236)

DOE/JPL/954614-1 PC **A05**/MF **A01**
Northrop Research and Technology Center, Palos Verdes Peninsula, CA.
Lifetime and Diffusion Length Measurements on Silicon Material and Solar Cells.
S. Othmer, and S. C. Chen. 1977, 99p
Contract NAS-7-100-954614

Experimental methods were evaluated for the determination of lifetime and diffusion length in silicon intentionally doped with potentially lifetime-degrading impurities found in metallurgical grade silicon, impurities which may be residual in low-cost silicon intended for use in terrestrial flat-plat arrays. Results obtained by these methods were compared for mutual consistency. Lifetime measurements were made using a steady-state photoconductivity method, which was compared with a photoconductivity decay technique. Diffusion length determinations were made using short-circuit current measurements under penetrating illumination. This method was compared with a direct measurement of diffusion length using a scanning electron microscope. Mutual consistency among all experimental methods was verified, but steady-state photoconductivity was found preferable to photoconductivity decay at short lifetimes and in the presence of traps. The effects of a number of impurities on lifetime in bulk material, and on diffusion length in cells fabricated from this material, were determined. Results were compared with those obtained by others on the same material and devices using different techniques. General agreement was found in terms of the hierarchy of impurities which degrade the lifetime. (ERA citation 04:051237)

DOE/JPL/954654-5 PC **A04**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Silicon Web Process Development: Low Cost Solar Array Project, Large Area Silicon Sheet Task. Quarterly Report, July 1--September 30, 1978.
C. S. Duncan, R. G. Seidensticker, R. H. Hopkins, J. P. McHugh, and H. A. Wehrli. 1978, 60p
Contract NAS-7-100-954654

A manually operated system for continuous melt replenishment was completed and installed in the RE web growth facility. Initial results are positive though incomplete. Polysilicon pellets were fed for comparatively short periods, to 14 minutes, while web was growing without any disturbance from the pellet feed. A bench model of a manually-controlled mechanial pellet feeder was developed for later inclusion in the melt replenishment system. An after-heater with adjustable temperature and adjustable temperature gradient was installed in the J web growth facility for the purpose of controlling the vertical temperature gradient and the thermal stress generated in the growing web. The initial operation disclosed that the range of temperatures was somewhat less than intended and minor modifications have been made but not yet evaluated. The W web growth facility has performed well with respect to width control. Two problems have persisted and are undergoing developmental improvement: excessive deposits of oxide on the web, lid and heat shields and, secondly, objectionably high stress in the web. Computer models of temperature profile and stress are being used to support the development of lower stress in web grown from the W facility and the J facility which includes the afterheater system for vertical temerature gradient control. In addition, actual stress measurements in web grown are routinely made in order to evaluate results. (ERA citation 04:051238)

DOE/JPL/954777-5 PC **A02**/MF **A01**
AeroChem Research Labs., Inc., Princeton, NJ.
Silicon Halide--Alkali Metal Flames as a Source of Solar Grade Silicon.
D. B. Olson, and W. J. Miller. Oct 78, 15p
AeroChem-TN-199
Contract NAS-7-100-954777

This program is designed to demonstrate the feasibility of using alkali metal-silicon halide diffusion flames to produce solar-cell-grade silicon in large quantities at low cost. Prior work has demonstrated that high purity silicon (metallic impurities < 5 ppm) can be produced using Na + SiCl sub 4 and Na + SiF sub 4 flames. Much lower flame temperatres were observed in the latter case as well as low silicon yields due to Na sub 2 SiF sub 6 formation. Work performed during the current reporting period has shown that reactor wall temperaure of approximately 1000 K are sufficient to prevent formation of Na sub 2 SiF sub 6 . Silicon produced from SiF sub 4 appears identical in form and purity to that from SiCl sub 4 although product collection and separation are less thermo-chemically favored in the fluoride system. To separate the silicon from the byproduct salt in an efficient and continuous mannor, higher temeratures are necessary. Resistively heated thin-walled graphite tubular reactors

have been used to achieve these temperatures (> 1700 K), and successful product separation has been experimentally demonstrated using a Na + SiCl sub 4 flame. Keys to this success appear to be sustaining high reaction temperatures and not using a diluent gas in the recent flows. (ERA citation 04:051239)

DOE/JPL/954868-3 PC **A03**/MF **A01**
Alabama A and M Univ., Normal.
Automated Array Assembly, Phase II. Quarterly Report No. 3, April 1--June 30, 1978.
R. V. D'Aiello. Jun 78, 44p
Contract NAS-7-100-954868

The purpose of the overall program is to establish technological readiness and provide verification for the elements of a manufacturing sequence which would ultimately be suitable for the large-scale production of silicon solar-array modules at a selling price of less than $500/kW. A program and process plan for accomplishing this objective was developed and put into operation. This plan is centered around a processing sequence using Czochralski, silicon wafers. Three junction-formation processes are considered since cost analyses show that they do not differ greatly in cost. The progress made in the various process steps of the plan is described, and plans for the next quarter are summarized. (ERA citation 04:051240)

DOE/JPL/954914-4 PC **A03**/MF **A01**
Schumacher (J.C.) Co., Oceanside, CA.
High Velocity Continuous-Flow Reactor for the Production of Solar Grade Silicon. Fourth Quarterly Report, June 25--September 24, 1978.
L. Woerner. Sep 78, 35p
Contract NAS-7-100-954914

The main effort has been concentrated on investigating the pyrolysis of tribromosilane in a fluid bed reactor. Excellent results have been achieved in this area with the yields running in excess of 90% of the theoretical possible for the reaction given below: 4SiHBr sub 3 = 2H sub 2 + 3SiBr sub 4 + Si. An average growth rate of 0.5 microns per minute, based on starting and ending sieve analysis data for the bed, has been noted. This coating on the particles is a very fine nodular coherent coating. Since the reaction cited generates 3 moles of SiBr sub 4 for each mole of Si, an investigation was begun to determine if SiBr sub 4 could be converted to SiHBr sub 3 by reaction with a heated bed of silicon and hydrogen. Preliminary experiments have shown that this is readily feasible. This factor allows the description of closed loop process in which only silicon is consumed and produced. The cycle is given below. Decomposition: SiHBr sub 3 = Si + 2H sub 2 + 3SiBr sub 4 . Conversion: 2H sub 2 + SiBr sub 4 + Si/sub (met)/ = SiHBr sub 3 . (ERA citation 04:051243)

DOE/JPL/954929-3 PC **A03**/MF **A01**
Clemson Univ., SC.
Investigation of Reliability Attributes and Accelerated Stress Factors on Terrestrial Solar Cells. Third Quarter Report, June 9--September 9, 1978.
J. W. Lathrop, and J. L. Prince. 15 Oct 78, 43p
Contract NAS-7-100-954929

Results of the third quarter of work on the program Investigation of Reliability Attributes and Accelerated Stress Factors of Terrestrial Solar Cells include completing all Phase I tests except for Thermal Shock. Results of these preliminary tests are used to define the larger quantity Phase II tests and a number of these were begun during the quarter. A program was initiated to observe the effects of accelerated testing on cell metalization adherence. Degradation of electrical performance was observed on one type of cell after B-T testing. Mechanical fracturing was observed in two types of cells after thermal cycling. (ERA citation 04:051244)

FE-2664-T2 PC **A07**/MF **A01**
AiResearch Mfg. Co. of Arizona, Phoenix.
Ceramic Technology Readiness Program Interim Report: HiCAT Conceptual Design Study.
1 Nov 78, 133p
Contract EF-77-C-01-2664

The report presents the results of the conceptual design study for the DOE sponsored Ceramic Technology Readiness (CTR) program under Contract EF-77-C-012664. The major objectives of this program are to develop ceramic technology for utility gas turbines operating at 2600 exp 0 F turbine inlet temperature with uncooled turbine blades and utilizing coal-derived fuels. The CTR program objectives are met with the use of the High Temperature Ceramic Augmentation Turbine (HiCAT) concept. This concept consists of a specifically designed high-pressure ceramic turbocompressor, thermodynamically coupled to a low-pressure metallic gas turbine. The low-pressure spool is a modified Brown Boveri Type 11 gas turbine. Three HiCAT conceptual designs are presented. Each design is defined within a complete power plant configuration that includes a Lurgi coal gasification plant, HiCAT gas turbine, and a steam combined cycle. (ERA citation 04:051420)

FE-6010-12 PC **A06**/MF **A01**
National Bureau of Standards, Washington, DC.
National Measurement Lab.
Development, Testing and Evaluation of MHD-Materials. Quarterly Report, April--June 1978.
W. R. Hosler, T. Negas, and S. J. Schneider. 30 Jun 78, 112p
Contract EA-77-A-01-6010-035

The overall objective of this program is to obtain chemical and physical definition of high temperature materials which have shown promise for use in coal-fired open-cycle MHD power systems. Initial results on a coal slag intermediate in composition to Illinois No. 6 and Montana Rosebud slags show that the log viscosity is raised about 20% by a 15% concentration of K sub 2 O seed. Slag exposed to pressurized steam undergoes a change that increases the log viscosity by about 5%. The pre-test electrical conductivity of the U-02 Phase III materials has been completed. Analysis of diffusion between MAFF 31 (3MgAl sub 2 O sub 4 .Fe sub 3 O sub 4) electrode material and MgAl sub 2 O sub 4 insulator material showed that the diffusion coefficients at 1600 exp 0 C for Mg were at least twice as large as those for Al, although Fe diffusion was still the dominant metal diffusion process. The electrochemical effects in a simulated slag flow using platinum electrodes indicate substantial attack on the cathode electrode and minimal effect on the iron depleted layer on the anode. Approximately 50 materials from external sources have been analyzed structurally by x-ray diffraction methods. The post test analysis of the electrodes tested at MIT February 28, 1978 (MIT 228-NBS F) has been completed. Stainless steel 304 was tested in the hot corrosion apparatus for 4 hours at 550 exp 0 C using K sub 2 SO sub 4 . Extensive corrosion was not detected although discontinuous and localized oxidation/sulfidation was noted. Physical property data and prices are given on two new alloys that may prove to be more cost effective than 310 SS where sulfidizing is a problem such as the seed recovery system. (ERA citation 04:051836)

N79-32630/2 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Characterization of Solar Cells for Space Applications. Volume 8: Electrical Characteristics of Spectrolab Bsf, Bsr, Textured 290-Micron Solar Cells (K7) as a Function of Intensity, Temperature and Irradiation.
B. E. Anspaugh, D. M. Beckert, R. G. Downing, T. F. Miyahira, and R. S. Weiss. 1 Sep 79, 43p
NASA-CR-162290, JPL-PUB-78-15-V-8
Contract NAS7-100

A set of parametric data is presented on the Spectrolab textured, back-surface-field, back-surface-reflector solar cell which is a commercially available product.

N79-32631/0 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Characterization of Solar Cells for Space Applications. Volume 9: Electrical Characteristics of Spectrolab Bsf, Textured, 10-Ohm-cm 200-Micron Cells as a Function of Intensity, Temperature, and Irradiation.
B. E. Anspaugh, D. M. Beckert, R. G. Downing, T. F. Miyahira, and R. S. Weiss. 15 Sep 79, 43p
NASA-CR-162289, JPL-PUB-78-15-V-9
Contract NAS7-100

Electrical characteristics of textured, back surface field, 10 ohm cm, 200 micron silicon solar cells are presented. A filtered solar simulator was used in order to approximate the spectral distribution of space sunlight. The temperature range covered was from -160 C to 140 C while the solar intensity range covered was 5 mW/sq cm to 250 mW/sq cm. The data were taken at each environment point in the matrix in the form of an I-V curve.

N79-32632/8 PC **A07**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
A Preliminary Assessment of Small Steam Rankine and Brayton Point-Focusing Solar Modules.
E. J. Roschke, L. Wen, H. Steele, N. Elgabalawi, and J. Wang. 1 Mar 79, 140p NASA-CR-162302, JPL-PUB-79-21
Contract NAS7-100
Subm-Prepared for DOE.

A preliminary assessment of three conceptual point-focusing distributed solar modules is presented. The basic power conversion units consist of small Brayton or Rankine engines individually coupled to two-axis, tracking, point-focusing solar collectors. An array of such modules can be linked together, via electric transport, to form a small power station. Each module also can be utilized on a stand-alone basis, as an individual power source.

N79-32633/6 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Lsa Project Technology Development Updata.
Low-Cost Solar Array Project.
J. V. Goldsmith, and D. B. Bickler. 30 Aug 78, 26p NASA-CR-162301, JPL-PUB-79-26
Contract NAS7-100
Subm-Prepared for DOE. Conf-Presented at 10TH Project Integration Meeting, Pasadena, Calif., 16-17 Aug. 1978.

The state of low cost solar array technology is discussed. The goal of achieving $500/kW by 1986 is also discussed.

N79-32634/4 PC **A05**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Evaluation of Cellular Glasses for Solar Mirror Panel Applications.
Advanced Solar Thermal Technology Project.
M. Giovan, and M. Adams. 15 Jun 79, 98p
NASA-CR-162303, JPL-PUB-79-61
Contract NAS7-100
Subm-Prepared for DOE.

An analytic technique was developed to compare the structural and environmental performance of various materials considered for backing of second surface glass solar mirrors. Cellular glass was determined to be a prime candidate due to its low cost, high stiffness-to-weight ratio, thermal expansion match to mirror glass, evident minimal environmental impact and chemical and dimensional stability under conditions of use. The current state of the art and anticipated developments in cellular glass technology are discussed; material properties are correlated to design requirements. A mathematical model is presented which suggests a design approach which allows minimization of life cost; and, a mechanical and environmental testing program is outlined, designed to provide a material property basis for development of cellular glass hardware, together with methodology for collecting lifetime predictive data. Preliminary material property data from measurements are given. Microstructure of several cellular materials is shown, and sensitivity of cellular glass to freeze-thaw degradation and to slow crack growth is discussed. The effect of surface coating is addressed.

N79-32635/1 PC **A02**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Results of the 1978 NASA/JPL Balloon Flight Solar Cell Calibration Program.
C. H. Seaman, and L. B. Sidwell. 1 Sep 79, 13p
NASA-CR-162298, JPL-PUB-79-66
Contract NAS7-100

The 1978 scheduled solar cell calibration balloon flight was successfully completed. Thirty six modules were carried to an altitude of above 36 kilometers. Recovery of telemetry and flight packages was without incident. These calibrated standard cells are used as reference standards in simulator testing of cells and arrays with similar spectral re-

sponse characteristics. The factors affecting the spectral transmission of the atmosphere at various altitudes are summarized.

N79-32638/5 PC **A02**/MF **A01**
Hughes Aircraft Co., El Segundo, Calif. Space and Communications Group.
Conceptual Design Study of Concentrator Enhanced Solar Arrays for Space Applications Volume 1: Study Overview and Summary.
Interim Final Report.
15 May 79, 18p NASA-CR-162328, HAC-REF-E3256-V-1
Contracts NAS7-100, JPL-955194

The enhancement of arrays of thin silicon solar cells was studied, including the investigation of thin gallium arsenide cells and conventional thick silicon cells on a rigid substrate. Concentrator concepts employing thin film Kapton mirrors were evaluated for performance in space environments.

N79-32639/3 PC **A06**/MF **A01**
Hughes Aircraft Co., El Segundo, Calif. Space and Communications Group.
Conceptual Design Study of Concentrator Enhanced Solar Arrays for Space Applications Volume 2: Technical.
Interim Final Report.
15 May 79, 115p HAC-REF-E3256-V-2
Contracts NAS7-100, JPL-955194

Concentrator concepts which utilize Kapton mirror material were evaluated and selected for solar array use due to their zero mass. All concepts considered employed thin silicon solar cells. Design requirements for the concentrator were: the cell temperature was not to exceed 150 C; the concentrators were to produce illumination of the array within 15% of being perfectly uniform; the concentrators were to operate while misaligned as much as 5 degrees with the solar axis. Concentrator designs along with mirror structure and configurations are discussed and comparisons are made for optimal space applications.

N79-32640/1 PC **A13**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Solar Cell High Efficiency and Radiation Damage, 1979.
Aug 79, 290p NASA-CP-2097, D-133
Conf-Conf. Held at Cleveland, 13-14 Jun. 1979.

No abstract available.

N79-32699/7 PC **A04**/MF **A01**
PRC Energy Analysis Co., McLean, Va.
Economic and Demographic Issues Related to Deployment of the Satellite Power System (SPS).
T. E. Baldwin, L. G. Hill, D. J. Santini, and E. J. Stenehjem. Oct 78, 71p NASA-CR-158886, ANL/EES/TM-23
Contract W-31-109-ENG-38
Subm-Sponsored in Part by NASA.

Growth in energy consumption stimulated interest in exploitation of renewable sources of electric energy. One technology that was proposed is the Satellite Power System (SPS). Before committing the U.S. to such a large program, the Department of Energy and the National Aeronautics and Space Administration are jointly participating in an SPS Concept Development and Evaluation Program. This white paper on industrial and population relocation is part of the FY 78 preliminary evaluation of related socio-economic issues. Results of four preliminary assessment activities are documented.

N79-32730/0 PC **A08**/MF **A01**
Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (Germany, F.R.). Unternehmensbereich Raumfahrt.
Development of a Prototype 10KW Solar Power Plant.
Final Report.
D. Wolf, H. Bihlmayr, J. Carl, V. Merges, and P. Prikryl. Dec 78, 167p BMFT-FB-T-78-33
Contract BMFT-03E-4055-C/ETS-8000
In German; English Summary.

A solar power plant built in the Federal Republic of Germany is described. The development of three other small plants for the generation of electricity from solar energy is also reported on. The design, installation, and commissioning of the plant and of the supporting systems are reviewed. Autonomous operation using technologies as simple as possible and components from series production is emphasized. During acceptance tests the specified maximum net electrical power output of 10 kW at a cooling water temperature of 35 C, the observance of the voltage and frequency tolerances for the generated current, and partial load operation were successfully demonstrated. Further long term tests under real operation conditions are recommended.

N79-32731/8 PC **A02**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
Investigations on the Aeroelastic Stability of Large Wind Turbines.
H. H. Ottens, and R. J. Zwaan. 10 Apr 78, 21p NPL-MP-78014-U
Conf-Presented at the 2D Intern. Symp. On Wind Energy Sys., Amsterdam, 3-5 Oct. 1978.

The aeroelastic stability of wind turbines with vertical axis (VAWT) and with horizontal axis (HAWT) is discussed. Results are given for an existing 5 m VAWT test-bed with and without a tie-down system. Finally, difficulties are discussed in interpreting preliminary results for a horizontal axis wind turbine. Stability, diagrams are shown.

N79-32733/4 PC **A02**/MF **A01**
Austrian Solar and Space Agency, Vienna.
Meteorological Data for Solar Energy Applications.
M. Bruck. 1978, 12p

Meteorological quantities and the mathematical techniques used for acquiring them are presented. Their relevance to solar energy utilization is emphasized. Following a discussion of the definitions of extraterrestrial solar radiation and terrestrial radiation (thermal radiation), meteorological radiation quantities are listed and a formula, easily adaptable to a programmable pocket calculator, for the calculation of the yearly variation in the global radiation incident on a horizontal plane is presented. Air temperature, relative humidity, and wind are also discussed as important meteorological parameters.

N79-33559/2 PC **A06**/MF **A01**
TRW Defense and Space Systems Group, Redondo Beach, Calif.
High Temperature - Low Mass Solar Blanket.
Final Report.
H. G. Mesch. Aug 79, 121p NASA-CR-162334, TRW-32809.000
Contracts NAS7-100, JPL-955139
Subm-Prepared for JPL.

Interconnect materials and designs for use with ultrathin silicon solar cells are discussed, as well as the results of an investigation of the applicability of parallel-gap resistance welding for interconnecting these cells. Data relating contact pull strength and cell electrical degradation to variations in welding parameters such as time, voltage and pressure are presented. Methods for bonding ultrathin cells to flexible substances and for bonding thin (75 micrometers) covers to these cells are described. Also, factors influencing fabrication yield and approaches for increasing yield are discussed. The results of vacuum thermal cycling and thermal soak tests on prototype ultrathin cell test coupons and one solar module blanket are presented.

N79-33560/0 PC **A16**/MF **A01**
General Electric Co., Schenectady, N. Y.
Conceptual Design of Thermal Energy Storage Systems for Near Term Electric Utility Applications.
Final Report.
E. W. Hall, W. Hausz, R. Anand, N. Lamarche, and J. Oplinger. Jul 79, 359p NASA-CR-159577, GE79ET0101
Contracts DEN3-12, EC-77-A-31-1034-2
Subm-Sponsored by NASA Prepared for Doe.

Potential concepts for near term electric utility applications were identified. The most promising ones for conceptual design were evaluated for their economic feasibility and cost benefits. The screening process resulted in selecting two coal-fired and two nuclear plants for detailed conceptual design. The coal plants utilized peaking turbines and the nuclear plants varied the feedwater extraction to change power output. It was shown that the performance and costs of even the best of these systems could not compete in near term utility applications with cycling coal plants and typical gas turbines available for peaking power. Lower electricity costs, greater flexibility of operation, and other benefits can be provided by cycling coal plants for greater than 1500 hours of peaking or by gas turbines for less than 1500 hours if oil is available and its cost does not increase significantly.

N79-33562/6 PC **A04**/MF **A01**
Spectrolab, Inc., Sylmar, Calif.
Investigation of Proposed Process Sequence for the Array Automated Assembly Task, Phase 2.
Quarterly Technical Progress Report, period ending 30 Jun. 1979.
N. Mardesich, A. Garcia, S. Bunyan, and A. Pepe. Jul 79, 59p NASA-CR-162364, DOE/JPL-954853-79/3
Contract JPL-954853
Subm-Sponsored by NASA Prepared for JPL and Doe.

The technological readiness of the proposed process sequence was reviewed. Process steps evaluated include: (1) plasma etching to establish a standard surface; (2) forming junctions by diffusion from an N-type polymeric spray-on source; (3) forming a p+ back contact by firing a screen printed aluminum paste; (4) forming screen printed front contacts after cleaning the back aluminum and removing the diffusion oxide; (5) cleaning the junction by a laser scribe operation; (6) forming an antireflection coating by baking a polymeric spray-on film; (7) ultrasonically tin padding the cells; and (8) assembling cell strings into solar circuits using ethylene vinyl acetate as an encapsulant and laminating medium.

N79-33563/4 PC **A03**/MF **A01**
Solarex Corp., Rockville, Md.
Analysis of the Effects of Impurities in Silicon.
Quarterly Report, 1 May - 31 Jul. 1979.
J. H. Wohlgemuth, W. M. Lafky, and J. H. Burkholder. 31 Jul 79, 44p NASA-CR-162350, DOE/JPL-955307-79/2
Contract JPL-955307
Subm-Sponsored by NASA Prepared for JPL and Doe.

A solar cell fabrication and analysis program to determine the effects on the resultant solar cell efficiency of impurities incorporated into silicon is conducted. Flight quality technologies and quality assurance are employed to assure that variations in cell performance are due to the impurities incorporated in the silicon. The type and level of impurity doping in each test lot is given and the mechanism responsible for the degradation of cell performance is identified and correlated to the doped impurities.

N79-33564/2 PC **A02**/MF **A01**
Spire Corp., Bedford, Mass.
Integral Glass Encapsulation for Solar Arrays.
Quarterly Progress Report.
Jun 79, 18p NASA-CR-162361, DOE/JPL-954521-79/2
Contract JPL-954521
Subm-Sponsored by NASA and Doe Prepared for JPL.

Progress in the development of permanent, integral glass encapsulation of terrestrial solar photovoltaic arrays by electrostatic bonding is reported. Two basic types of electrostatically bonded modules were demonstrated and their reliability proven in accelerated environmental testing. Economic analyses indicate that electrostatic bonding can be a cost effective, practical, and automatable process for large-scale production of arrays with lifetimes of more than 20 years.

N79-33565/9 PC **A03**/MF **A01**
Lamar Univ., Beaumont, Tex. Dept. of Chemical Engineering.
Process Feasibility Study in Support of Silicon Material Task 1.
Quarterly Technical Progress Report, Jun. - Aug. 1979.

K. Y. Li, K. C. Hansen, and C. L. Yaws. Sep 79, 45p NASA-CR-162354, QTPR-16
Contract JPL-954343
Subm-Sponsored by NASA Prepared for JPL and Doe.

Analysis of process system properties was continued for silicon source materials under consideration for producing silicon. The following property data are reported for dichlorosilane which is involved in processing operations for silicon: critical constants, vapor pressure, heat of vaporization, heat capacity, density, surface tension, thermal conductivity, heat of formation and Gibb's free energy of formation. The properties are reported as a function of temperature to permit rapid engineering usage. The preliminary economic analysis of the process is described. Cost analysis results for the process (case A-two deposition reactors and six electrolysis cells) are presented based on a preliminary process design of a plant to produce 1,000 metric tons/year of silicon. Fixed capital investment estimate for the plant is $12.47 million (1975 dollars) ($17.47 million, 1980 dollars). Product cost without profit is 8.63 $/kg of silicon (1975 dollars)(12.1 $/kg, 1980 dollars).

N79-33566/7 PC **A03**/MF **A01**
ARCO Solar, Inc., Chatsworth, Calif.
Vacuum die Casting of Silicon Sheet for Photovoltaic Applications.
Quarterly Report, 16 Mar. - 30 Jun. 1979.
30 Jun 79, 31p NASA-CR-162360, DOE/JPL-955325-79/1
Contract JPL-955325
Subm-Sponsored by NASA and Doe Prepared for JPL.

The development of a vacuum die-casting process for producing silicon sheet suitable for photovoltaic cells with a terrestrial efficiency greater than 12 percent and having the potential to be scaled for large quantity production is considered. The initial approach includes: (1) obtaining mechanical design parameters by using boron nitride, which has been shown to non-wetting to silicon; (2) optimizing silicon nitride material composition and coatings by sessile drop experiments; (3) testing effectiveness of fluoride salt interfacial media with a graphite mold; and (4) testing the effect of surface finish using both boron nitride and graphite. When the material and mechanical boundary conditions are established, a finalized version of the prototype assembly will be constructed and the casting variables determined.

N79-33567/5 PC **A02**/MF **A01**
Siltec Corp., Menlo Park, Calif.
LSA Large Area Silicon Sheet Task Enhanced I.D. Slicing Technology for Silicon Ingots.
Quarterly Report, Feb. - Mar. 1979.
D. Walters. Apr 79, 22p NASA-CR-162359, DOE/JPL-955282-79/1
Contract JPL-955282
Subm-Sponsored by NASA and Doe Prepared for JPL.

Development of inside diameter slicing technology to significantly increase the number of useable slices per inch of crystal over industry practice is discussed. The required reduction of both blade and slice thickness is to be accomplished by a combination of three key elements of slicing technology: (1) ingot rotation with minimum exposed blade area; (2) dynamic cutting edge control; and (3) the use of prefabricated insert blades. Design modifications on a slicing saw with microprocessor controls and hardware fabrication to complete this conversion were initiated. Several runs were conducted on the engineering saw incorporating the method of ingot rotation. Ingots with diameters up to six inches were sliced successfully on a production saw.

N79-33569/1 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, Pa.
Phase 2 of the Array Automated Assembly Task for the Low Cost Solar Array Project.
Quarterly Report, 1 Apr. - 30 Jun. 1979.
R. B. Campbell, P. Rai-choundhury, E. J. Seman, A. Rohatgi, and J. R. Davis. 5 Sep 79, 26p NASA-CR-162131, QR-7
Contracts NAS7-100, JPL-954873
Subm-Prepared for JPL and Doe.

Two process specifications supplied by contractors were tested. The aluminum silk screening process resulted in cells comparable to those from sputtered Al. The electroless plating of contacts specification could be used only with extensive modification. Several experiments suggest that there is some degradation of the front junction during the Al back surface field (BSF) fabrication. A revised process sequence was defined which incorporates Al BSF formation. A cost analysis of this process yielded a selling price of $0.75/watt peak in 1980.

N79-33572/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Annealing of Radiation Damage in 0.1- and 2-Ohm-Centimeter Silicon Solar Cells.
I. Weinberg, and C. K. Swartz. Oct 79, 13p NASA-TP-1559, E-9997

Isochronal and isothermal annealing studies were conducted on 0.1 and 2 ohm centimeter n(+)/p silicon cells after irradiation by 1 MeV electrons at fluences of 10 to the 14th power, 5 times 10 to the 14th power, and 10 to the 15th power per square centimeter. For the 0.1 ohm centimeter cells, reverse annealing was not observed in the isochronal data. However, reverse annealing was observed between approximately 200 and 325 C in the isochronal data of the 2 ohm centimeter cells. Isothermal annealing of 0.1 ohm centimeter cells at 500 C restored pre-irradiation maximum power P sub max within 20 minutes at fluence = 10 to the 14th power, in 180 minutes at fluence = 5 times 10 to the 14th power and to 92 percent of pre-irradiation P sub max in 180 minutes for fluence = 10 to the 15th power. Annealing at 450 C was found inadequate to restore 0.1 ohm centimeter cell performance within reasonable times for all fluence levels. By comparison, at 450 C, the P sub max of 2 ohm centimeter cells was restored within 45 minutes, for the two highest fluence levels, while for the lowest fluence, restoration was completed within 15 minutes. Spectral response data indicate that, for both resistivities, degradation occurs predominantly in the cells p-type base region.

N79-33573/3 PC **A13**/MF **A01**
Ford Aerospace and Communications Corp., Newport Beach, Calif. Aeroneutronic Div.
Phase 1 of the First Solar Small Power System Experiment (Experimental System No. 1). Volume 1: Technical Studies for Solar Point-Focusing, Distributed Collector System, with Energy Conversion at the Collector, Category C.
Final Report.
T. B. Clark. 5 May 79, 294p NASA-CR-162369, U-6529-V-1
Contracts NAS7-100, JPL-955115
Seri-3. Subm-Prepared for JPL.

The technical and economic feasibility of a solar electric power plant for a small community is evaluated and specific system designs for development and demonstration are selected. All systems investigated are defined as point focusing, distributed receiver concepts, with energy conversion at the collector. The preferred system is comprised of multiple parabolic dish concentrators employing Stirling cycle engines for power conversion. The engine, AC generator, cavity receiver, and integral sodium pool boiler/heat transport system are combined in a single package and mounted at the focus of each concentrator. The output of each concentrator is collected by a conventional electrical distribution system which permits grid-connected or stand-alone operation, depending on the storage system selected.

N79-33574/1 PC **A13**/MF **A01**
Ford Aerospace and Communications Corp., Newport Beach, Calif. Aeronutronic Div.
Phase 1 of the First Solar Small Power System Experiment (Experimental System No. 1). Volume 2: Appendix a - D.
Final Report.
T. B. Clark. 5 May 79, 279p NASA-CR-162370, U-6529-V-2
Contracts NAS7-100, JPL-955115
Seri-3. Subm-Prepared for JPL.

Recommended conceptual designs for the baseline solar concentrator and electrical subsystems are defined, and trade offs that were evaluated to arrive at the baseline systems are presented. In addition, the developmental history of the Stirling engine is reviewed, the U4 configuration is described, and a Stirling engine heat pipe system is evaluated for solar application where sodium vapor is used as the heat source. An organic Rankine cycle engine is also evaluated for solar small power system application.

N79-33575/8 PC **A09**/MF **A01**
Ford Aerospace and Communications Corp., Newport Beach, Calif. Aeronutronic Div.
Phase 1 of the First Solar Small Power System Experiment (Experimental System No. 1). Volume 3: Appendix E - N.
Final Report.
T. B. Clark. 5 May 79, 187p NASA-CR-162371, U-6529-V-3
Contracts NAS7-100, JPL-955115
Seri-3. Subm-Prepared for JPL.

The design of a solar electric power plant for a small community is reported. Topics covered include: (1) control configurations and interface requirements for the baseline power system; (2) annual small power system output; (3) energy requirements for operation of the collectors and control building; (4) life cycle costs and reliability predictions; (5) thermal conductivities and costs of receiver insulation materials; (6) transient thermal modelling for the baseline receiver/thermal transport system under normal and inclement operating conditions; (7) high temperature use of sodium; (8) shading in a field of parabolic collectors; and (9) buffer storage materials.

N79-33576/6 PC **A04**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Phase 1 of the First Small Power System Experiment (Engineering Experiment No. 1). Volume 1: Executive Summary.
Final Report.
R. J. Holl. May 79, 69p NASA-CR-162372, MDC-G7833-V-1
Contracts NAS7-100, JPL-955117
Seri-5. Subm-Prepared for JPL.

The development of a modular solar thermal power system for application in the 1 to 10 MWe range is presented. The system is used in remote utility applications, small communities, rural areas, and for industrial uses. Investigations are performed on the energy storage requirements and type of energy storage, concentrator design and field optimization, energy transport, and power conversion subsystems. The system utilizes a Rankine cycle, an axial flow steam turbine for power conversion, and heat transfer sodium for collector fluid.

N79-33577/4 PC **A14**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Phase 1 of the First Small Power System Experiment (Engineering Experiment No. 1). Volume 2: System Concept Selection.
Final Report.
R. J. Holl. May 79, 312p NASA-CR-162373, MDC-G7833-V-2
Contracts NAS7-100, JPL-955117
Seri-5. Subm-Prepared for JPL.

The development of a modular solar thermal power system for application in the 1 to 10 MWe range is presented. The system is used in remote utility applications, small communities, rural areas, and for industrial uses. Systems design and systems optimization studies are conducted which consider plant size, annual capacity factors, and startup time as variables. Investigations are performed on the energy storage requirements and type of energy storage, concentrator design and field optimization, energy transport, and power conversion subsystems. The system utilizes a Rankine cycle, an axial flow steam turbine for power conversion, and heat transfer sodium for collector fluid.

N79-33578/2 PC **A16**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

Phase 1 of the First Small Power System Experiment (Engineering Experiment No. 1). Volume 3: Experimental System Descriptions.
Final Report.
R. J. Holl. May 79, 361p NASA-CR-162374, MDC-G7833-V-3
Contracts NAS7-100, JPL-955117
Seri-5. Subm-Prepared for JPL.

The design and development of a modular solar thermal power system for application in the 1 to 10 MWe range is described. The system consists of five subsystems: the collector, power conversion, energy transport, energy storage, and the plant control subsystem. The collector subsystem consists of concentrator, receiver, and tower assemblies. The energy transport subsystem uses a mixture of salts with a low melting temperature to transport thermal energy. A steam generator drives a steam Rankine cycle turbine which drives an electrical generator to produce electricity. Thermal and stress analysis tests are performed on each subsystem in order to determine the operational reliability, the minimum risk of failure, and the maintenance and repair characteristics.

N79-33579/0 PC **A06**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Phase 1 of the First Small Power System Experiment (Engineering Experiment No. 1). Volume 4: Commercial System Definition.
Final Report.
R. J. Holl. May 79, 113p NASA-CR-162375, MDC-G7833-V-4
Contracts NAS7-100, JPL-955117
Seri-5. Subm-Prepared for JPL.

The development and design of a modular solar thermal power system for application in the 1 to 10 MWe range is described. The system is used in remote utility applications, small communities, rural areas, and for industrial uses. The operational reliability, the minimum risk of failure, and the maintenance and repair characteristics are determined and the commercial system design is defined.

N79-33580/8 PC **A10**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Phase 1 of the First Small Power System Experiment (Engineering Experiment No. 1). Volume 5: Supporting Analyses and Trade Studies.
Final Report.
R. J. Holl. May 79, 210p NASA-CR-162376, MDC-G7833-V-5
Contracts NAS7-100, JPL-955117
Seri-5. Subm-Prepared for JPL.

The development and design of a modular solar thermal power system for application in the 1 to 10 MWe range is described. The system is used in remote utility applications, small communities, rural areas, and for industrial uses. Thermal and stress analyses are performed on the collector subsystem, energy storage subsystem, energy transport subsystem, the power conversion subsystem, and the plant control subsystem.

N79-33581/6 PC **A04**/MF **A01**
United Technologies Corp., South Windsor, Conn. Power Systems Div.
Advanced Technology Light Weight Fuel Cell Program.
Final Report, 9 May 1977 - 16 Jun. 1978.
R. E. Martin. 16 Jun 78, 73p NASA-CR-159653, FCR-1017
Contracts NAS3-20621, NAS3-20604

A high performance hydrogen-oxygen alkaline fuel cell was investigated. Cell performance goals include: 0.9 volts at a current density of 1000 amperes per sq ft for 3000 hours at a cell temperature up to 300 F and reactant pressure up to 250 psia. Subscale research cells were tested in the evaluation of five anode and five cathode catalyst configurations. Fuel cell matrices were fabricated from NASA supplied polybenzimidazole (PBI) powder. A cell edge frame and PBI matrix samples were corrosion tested in 42 wt% KOH at 250 F (121 C). A total of 13,828 hours of research cell testing at 250 F was completed. In addition 494 hours of testing at temperatures up to 300 F and reactant pressures up to 250 psia with 27 hours of operation at or above 0.9 V/c at 1000 ASF was completed. A supported platinum-on-carbon catalyst configuration demonstrated stable operation at high temperature. A new cell edge frame structure showed low weight loss during corrosion testing, an indication of the material stability and long life potential.

PNL-2004-10 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Development, Characterization and Evaluation of Materials for Open Cycle MHD. Quarterly Report for the Period Ending December 1978.
J. L. Bates, and D. D. Marchant. Jun 79, 58p
Contract EY-76-C-06-1830

The objectives of this program are to develop, test, characterize, and evaluate materials for open-cycle, coal-fired MHD power generators. The specific immediate goals emphasize electrode and insulator materials, including: (1) testing and evaluation of the enhanced effects of alkali seed on materials in a dc electric field; (2) development and testing of improved electrodes and insulators with controlled microstructures, compositions and properties; and (3) characterization and evaluation of materials relating to both the US MHD Program and the US-USSR Cooperative Program for MHD power generators. The scope of this program encompasses the following areas: (1) reproducible laboratory testing of both ceramic and metal electrode materials and insulator materials in alkali seed/slag under dc electric current and voltages, as functions of temperature, and seed/slag composition; (2) development and fabrication of electrodes, insulators, and other related materials with controlled electrical, chemical, and physical properties, including evaluation in laboratory tests in US MHD test facilities and as part of the US-USSR testing program; and (3) characterization and evaluation of materials tested under the US-USSR and the US MHD programs including the measurement and analysis of structural, chemical, and thermophysical properties of electrodes, insulators, slag, and other related materials before and after testing. Progress is reported. (ERA citation 04:051837)

RLO-2441-76/16 PC **A05**/MF **A01**
AeroVironment, Inc., Pasadena, CA.
Assessing the Local Wind Field for Siting of Wind Power Systems. Final Report, July 1976--June 1977.
P. B. MacCready, Jr. Sep 77, 67p
Contract EY-76-C-06-2441

The determining of flow field characteristics for a given wind turbine site is difficult. The best monitoring device would be some sort of remote monitor which continuously defines the entire three-dimensional flow field from ground to 100 m throughout a hilly region of, say, 5 km by 5 km. None exists. There are many alternative schemes which are available, each with its strengths and weaknesses. The schemes are examined in this report, from the perspective of their suitability for economically providing field observations with which exact sites in complex terrain can be selected. The mean wind profiles are considered to be first priority, with turbulence information secondary. Only techniques which are already operational are considered seriously here. The main attention is focused on the acoustic doppler technique. (ERA citation 04:051415)

SAN-1101/PA2-21 PC **A08**/MF **A01**
Aerospace Corp., El Segundo, CA. Energy and Transportation Div.
Solar-Powered Irrigation Systems. Technical Progress Report, July 1977--January 1978.
28 Feb 78, 159p ATR-78(7693-01)-1
Contract EY-76-C-03-1101-002

Dispersed solar thermal power systems applied to farm irrigation energy needs are analyzed. The 17 western states, containing 84% of nationwide irrigated croplands and consuming 93% of nationwide irrigation energy, have been selected to determine were solar irrigation systems can compete most favorably with conventional energy sources. Financial analysis of farms, according to size and ownership, was accomplished to permit realistic comparative analyses of system lifetime costs. Market potential of optimized systems has been estimated for the 17-state region for near-term (1985) and intermediate-term (2000) applications. Technical, economic, and institutional factors bearing on penetration and capture of this market are being identified. (ERA citation 04:051317)

SAN-1207-T1 PC **A05**/MF **A01**
Biphase Energy Systems, Santa Monica, CA.
Test Results: Direct Contact Heat Exchanger for Biophase Diesel Bottoming System.
N. L. Helgeson, W. R. Studhalter, and W. E. Amend. 5 Sep 78, 90p
Contract EY-76-C-03-1207

A subscale, direct contact heat exchanger (1-ft dia packed column) was built and operated under conditions applicable to the Biphase diesel bottoming cycle. Special probes for measuring gas and liquid temperatures and for measuring gas-phase compositions were designed and installed in the exchanger. The data obtained are unique in that they indicate both the extent of evaporation and condensation zones within the exchanger and the effect that those mass transport mechanisms have upon heat exchanger performance. For gas temperatures greater than 500 exp 0 F it was found that the maximum temperature to which Therminol 66 could be heated was strongly dependent upon vaporization effects. Data obtained are sufficient to provide for the preliminary design of a direct contact heat exchanger using Therminol 66 as the thermal fluid. Recommendations are made for further testing using other heat transfer fluids to derive a more general engineering approach to the design of direct heat exchangers. (ERA citation 04:051418)

SAN-1282-3 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Heterostructure Single Crystal Silicon Photovoltaic Solar Cells. Third Quarterly Report, April 1--June 30, 1977.
J. R. Szedon, T. A. Temofonte, and S. J. Fonash. 11 Sep 78, 46p
Contract EY-76-C-03-1282

Cells of the Al--SiO sub 2 --pSi type were made having electrical contact at their peripheries with large area n-p junctions. A model for the behavior of these devices was developed to treat their current--voltage behavior on illumination with the peripheral area masked. Open circuit voltage dependence on illumination level can be misinterpreted as indicating high values of diode ideality factor (n) associated with thermionic emission affected by a high density of interface states. Illuminated current--voltage characteristics of conventional cells (no peripheral n-p junctions) were taken for 25 exp 0 C < T < 100 exp 0 C. Neither thermionic emission of majority carriers into the oxide nor diffusion of minority carriers in the p-base region account for the observed dependence of open circuit voltage on temperature, although the latter does yield a value for temperature sensitivity which is reasonable. Studies of Au--SiO sub 2 --nSi cells have been made to evaluate Schottky barrier height values by photoemission and by capacitance-voltage behavior. The results agree with earlier descriptions of majority carrier thermionic emission as being the mechanism which determines open circuit voltage. (ERA citation 04:051249)

SAN-1282-4 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Heterostructure Single Crystal Silicon Photovoltaic Solar Cells. Fourth Quarter Report, July 1--September 30, 1977.
J. R. Szedon, T. A. Temofonte, H. C. Dickey, and S. J. Fonash. 18 Sep 78, 32p
Contract EY-76-C-03-1282

Studies have been made of the sensitivity of the behavior of Al--SiO sub 2 --pSi cells to details of formation of the back ohmic contact. Equivalently good behavior is obtained with aluminum or Ti--Pd--Au applied, without sintering, to a lapped, freshly etched back surface of the wafer. Good results for short circuit current enhancement with thermally evaporated films of Ta sub 2 O sub 5 as AR coatings have been obtained. Electron beam evaporated films of Ta sub 2 O sub 5 and spun-on films of TiO sub 2 from a liquid organometallic precursor give much lower open circuit voltage, due to ionizing radiation damage in the former instance and chemical interactions on baking in the latter case. Successful thinning of 80A thick Al films has

been done by slow (approx. 2A/min) etching in 1% H sub 2 SO sub 4 without affecting diode opposing current or open circuit voltage. Chemically treated and AR coated cells have been prepared with conversion efficiency (for the optically active area) of 11% on cells of nominal 0.1 cm exp 2 area. A summary of the program status after the first year of work is given. (ERA citation 04:051250)

SAN-1283-9 PC **A03**/MF **A01**
Exxon Research and Engineering Co., Linden, NJ. Government Research Labs.
Heterostructure Single Crystal Silicon Photovoltaic Cell: Extension. Type A, Semiconductor Heterojunction Silicon Devices. Final Report, May 15--August 10, 1978.
A. K. Ghosh, T. Feng, and C. Fishman. 1978, 50p
Contract EY-76-C-03-1287

Four areas of the technical task are reported: 1)device fabrication: involves fabrication of SnO sub 2 /Polycrystalline solar cells; 2) phenomenological and theoretical analysis; 3) degradation mechanism; and 4) encapsulation and life testing. The status of each project is reported. (ERA citation 04:051251)

SAN-1287-2 PC **A05**/MF **A01**
Motorola, Inc., Phoenix, AZ.
Thin Films of Silicon on Low-Cost Substrates. Final Report.
K. R. Sarma, R. W. Gurtler, A. Baghdadi, M. Cota, and W. C. Ramsey. 1978, 89p
Contract EY-76-C-03-1287

The main objective of this research program is to develop a new method of depositing thin films of polycrystalline silicon, utilizing an Energy Beam, for producing solar cells capable of meeting the long range economic and performance objectives of the D.O.E.'s National Photovoltaics Program. The overall process being investigated involves: 1) depositing microcrystalline silicon films on temporary (reuseable) substrates efficiently using the Energy beam, 2) grain enhancing the separated microcrystalline silicon films to produce a macrocrystalline (large grain) structure by RTR laser recrystallization, and 3) fabricating solar cells on the grain enhanced silicon films. Progress is reported. (ERA citation 04:051252)

SAN-1577-3 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Cadmium Sulfide/Copper Sulfide Heterojunction Cell Research. Technical Progress Report No. 2, January 1--March 31, 1978.
J. R. Szedon, F. A. Shirland, and W. J. Biter. 9 Aug 78, 36p
Contract EG-77-C-03-1577

Poor adhesion of CdS films to zinc-plated copper foil substrates has been eliminated by depositing somewhat thinner films than earlier and by using the mat (as opposed to the smooth) side of the electroformed copper foil for deposition. Particle spatter effects have been reduced and cells of 4 cm exp 2 area have been produced with average efficiency of 5.4%. Use of Zn--plated Cu, Mo, Zn--plated Mo and glass substrates appears to influence the etching behavior of CdS films in dilute chromic acid. The results suggest a sensitivity to the presence of zinc. Laser scanned reflection and photocurrent response studies reveal some influence of substrate morphology. Direct correlations are weak, presumably because of strong local variations in topography, due to texturing and in carrier transport or junction collection efficiency. Similar types of studies on single crystal-based cells have established the feasibility of using localized photoresponse to characterize minority carrier transport in special test structures. Compositional analysis of Cu sub 2 S layers on single crystal CdS have been attempted using ESCA and ion etching methods. A major problem is the formation of copper nodules, presumably due to the ion etching method, which do not permit obtaining a true profile of this element. Films of (Zn/sub x/Cd/sb 1-x/)S alloys, deposited using electron beam evaporation, have been made with composition corresponding to that of the evaporant sources. (ERA citation 04:051253)

SAND-79-1068 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Characteristics of Future Vertical-Axis Wind Turbines.
E. G. Kadlec. Jul 78, 20p
Contract EY-76-C-04-0789

As a DOE facility, Sandia Laboratories is developing Darrieus vertical-axis wind turbine (VAWT) technology. The objective of this technology is to assess the practicality of wind-energy systems for low-cost production and commercial marketing by private industry. This report describes the characteristics of current technology designs and assesses their cost-effectiveness. Better aerodynamics and future structural requirements combine for potential energy cost reductions of 35 to 40%. (ERA citation 04:051413)

SAND-79-1316 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Bibliography of Reports by the Sandia Photovoltaic Projects.
D. G. Schueler. Aug 79, 21p
Contract EY-76-C-04-0789

Sandia Laboratories manages the Systems Definition and Development and the Photovoltaic Concentrator Technology Development projects of the US Department of Energy's Photovoltaics Program. Technical information developed by these projects is disseminated through technical publications workshops, presentations at technical meetings, and contractor reports. This document, which is a compilation of photovoltaic reports and publications by Sandia Laboratories and its contractors, is provided as a convenient reference to workers in photovoltaic technology. It is in chronological order. (ERA citation 04:051255)

SAND-79-7021 PC **A04**/MF **A01**
Solarex Corp., Rockville, MD.
Silicon Concentrator Solar Cell Manufacturing Development.
C. Wrigley, G. Storti, and J. Wohlgemuth. Nov 78, 69p
Contract EY-76-C-04-0789

The program to design and develop the manufacturing technology for silicon solar cells sutiable for low-cost photovoltaic concentrator systems is summarized. Detailed discussions are presented for the following tasks: concentrator design, manufacturing process development, solar cell measurement and evaluation, results experienced in cell manufacturing, and production cost estimates. Several program conclusions and recommendations are given. In particular, it is found that (1) large-area concentrator cells with 15% efficiency at 50 suns are readily manufacturable; (2) DOE cost goals for 1981 to 1982 can be met today with market volumes at 200 to 1000 m exp 2 per year; and (3) respectable manufacturing yields are achievable with the technology now developed. (ERA citation 04:051256)

SAND-79-7040 PC **A10**/MF **A01**
Research Triangle Inst., Research Triangle Park, NC.
Novel Concentrator Photovoltaic Converter System Development. Final Report.
S. M. Bedair, M. F. Lamorte, and J. R. Hauser. Jul 79, 207p
Contract EY-76-C-04-0789

The long-range objective of this work is to develop, synthesize and evaluate a novel cascade solar cell having an AM 1 conversion efficiency of 30 percent or greater and capable of operating at both high illumination levels and elevated temperatures. The first year's work has been oriented toward demonstrating the cascade solar cell concept whereby two cells are internally connected in a monolithic structure to provide a voltage aiding series arrangement of the cells. Accomplishments during the first year include studies of the lower bandgap cell, the upper bandgap cell and the low impedance connecting junction. the material systems studied include GaInAs, AlGaAs, GaInP and AlGaInAs. The major accomplishment of the work has been the first experimental demonstration of a cascade solar cell structure in the GaAs/AlGaAs materials system. Test cells have demonstrated open circuit voltages as high as 2.2 volts and efficiencies in the 10 to 15% range without antireflecting layers. (ERA citation 04:051257)

TID-28931 PC **A04**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Heterostructure Single Crystal Silicon Photovoltaic Solar Cells. Fifth Quarterly Report, October 1--December 31, 1977.
J. R. Szedon, T. A. Temofonte, S. J. Fonash, and T. E. Sullivan. 9 Oct 78, 63p
Contract EY-76-C-03-1282

The performance of MIS solar cells of the Al-qcSiO sub 2 --pSi type has been enhanced by exposure to vapors of hydrofluoric acid. Open circuit voltage enhancement by about 10% to values of near 530 mV involves reduction of cell current opposing collected photocurrent. Short circuit enhancement by about 50% appears to be due to thinning of the thin aluminium electrode. Exposure to ambient water vapor results in loss of open circuit voltage and increased series resistance, but in a dry nitrogen ambient this does not occur. MIS cells made on polycrystalline silicon substrates generally exhibited behavior comparable to those on single crystal substrates but several cells had high values of n-factor (2 to 3), possible indicating grain boundary recombination influences. A summary is given of work done over a one year period at the Pennsylvania State University, treating basic mechanisms in MIS and Schottky barrier cells on n-type substrates. Three metals (Au, Pd, and Ag) were used. The differences in electronic and physical details of the cells and structures using these materials are discussed. (ERA citation 04:051259)

TID-29434(V.1) PC **A07**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume I. Test Description and Data Submittal.
Apr 77, 131p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. This report, in eight volumes, describes that test program and submits test data. Specifically, Volume I contains the test description including installation, instrumentation and data handling, test objectives, results commentary and data analysis. Volumes II through VIII are test data logs for Tests 17 through 23. These include all performance testing specified by the steam generator manufacturer (whereas previous testing was primarily given over to equipment checkout and proving of the test installation). The tests include steady-state, transient, trip simulation and asymmetric heat/input modes of operation. The testing was done in a vacant location of the turbine room at Riverside using available services: feedwater, condensate water, cooling water, instrument air, condenser cooling water discharge, low-voltage and 13.8 KV power. Heating of the steam generator was done using a radiant array consisting of quartz-iodine heat lamps to simulate reflected solar radiation. Steam raised in the steam generator was exhausted to ambient through the condenser cooling water discharge of an adjacent power generating unit. Heat balance calculations over the range of loads run indicate that about 70 percent of the input power going to the radiant array was absorbed by the steam generator, about 24 percent was absorbed by the cooling water going to the radiant array, and about 5 percent was unaccounted for. (ERA citation 04:051272)

TID-29434(V.2) PC **A11**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume II. Test No. 17.
13 Apr 77, 233p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the 10 MW Solar Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. Detailed test results are presented for test No. 17, performed April 13, 1977. The test

objectives were: (1) to achieve steady state operating conditions with outlet steam at 960 exp 0 F, at approximately 10,000 PPH steam flow; (2) to perform the following transient tests: (a) main steam step, (b) radiant array step, and (c) drum level shrink-and-swell; and (3) to perform a power trip under automatic control. (ERA citation 04:051273)

TID-29434(V.3) PC **A11**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume III. Test No. 18.
15 Apr 77, 239p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the 10 MW Solar Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. Detailed test data are given for test No. 18, performed on April 15, 1977. The test objectives were to perform the following transient tests: (a) power ramp transient; (b) cloud obstruction transient; (c) attemperator step transient; and (d) 67% step power increase transient. (ERA citation 04:051274)

TID-29434(V.4) PC **A08**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume IV. Test No. 19.
18 Apr 77, 167p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the 10 MW Solar Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. Detailed test procedures and results are presented for test No. 19, performed on April 18, 1977. The test objectives were: (1) to perform the following trip tests: (a) recirculation pump trip, (b) feedwater pump trip; (2) to operate the recirculation pump at various flow rates to demonstrate pump instability at flow rates above 100,000 PPH; (3) to obtain steady state data at several conditions; and (4) to perform a 40% step power increase transient. (ERA citation 04:051275)

TID-29434(V.5) PC **A09**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume V. Test No. 20.
19 Apr 77, 185p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the 10 MW Solar Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. Detailed results are presented for test No. 20, performed on April 19, 1977. The test objectives were: (1) to perform the following trip tests: (a) heliostat trip - decay to 800 exp 0 F main steam temperature, (b) heliostat trip - decay to 700 exp 0 F main steam temperature, and (c) heliostat trip - decay to 595 exp 0 F main steam temperature; (2) to perform the shrink and swell transient with a 225-second delay until automatic control; and (3) to tune the attemperator automatic control system. (ERA citation 04:051276)

TID-29434(V.6) PC **A13**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume VI. Test No. 21.
22 Apr 77, 280p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the 10 MW Solar Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. Detailed results of test No. 21, performed on April 21, 1977, are presented. The test objectives were to perform the asymmetric heating tests (with the solar simulator offset within the cavity) at three different power levels. (ERA citation 04:051277)

TID-29434(V.7) PC **A13**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume VII. Test No. 22.
26 Apr 77, 286p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the 10 MW Solar Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. Complete test results are reported for test No. 22, performed on April 26, 1977. The test objectives were: (1) to reperform the transient tests: (a) main steam step, (b) radiant array step, (c) drum level shrink and swell, (d) radiant array ramp, (e) cloud disturbance; and (2) to take steady state data at several power levels. (ERA citation 04:051278)

TID-29434(V.8) PC **A12**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
ERDA 10 MWe Solar Pilot Plant Subsystem Research Experiments, Steam Generator Tests at Northern States Power Riverside Station. Volume VIII. Test No. 23.
28 Apr 77, 266p
Contract EY-76-C-03-1109

In the spring of 1977 a 5 MW SRE steam generator, a scaled-down version of the 10 MW Solar Pilot Plant steam generator, was tested at the Riverside Station of Northern States Power Company in Minneapolis. Detailed test data are presented for test No. 23, performed on April 28, 1977. The test objectives were: (1) to take steady state heat balances at several points including maximum possible power, (2) to bring boiler to rated pressure at maximum rate, and (3) to monitor parameters while bottled up with array down. (ERA citation 04:051279)

10C. Energy Storage

N79-33881/0 PC **A06**/MF **A01**
Boeing Computer Services, Inc., Seattle, Wash. Energy Technology Applications Div.
An Expanded System Simulation Model for Solar Energy Storage (Technical Report), Volume 1.
Final Report.
A. W. Warren. Aug 79, 107p NASA-CR-159601, DOE/NASA/0042-79/1-V-1
Contracts DEN3-42, EX-76-A-31-1026
Seri-2.

The simulation model for wind energy storage (SIMWEST) program now includes wind and/or photovoltaic systems utilizing any combination of five types of storage (pumped hydro, battery, thermal, flywheel and pneumatic) and is available for the UNIVAC 1100 series and the CDC 6000 series computers. The level of detail is consistent with a role of evaluating the economic feasibility as well as the general performance of wind and/or photovoltaic energy systems. The software package consists of two basic programs and a library of system, environmental, and load components. The first program is a precompiler which generates computer models (in FORTRAN) of complex wind and/or photovoltaic source/storage/application systems, from user specifications using the respective library components. The second program provides the techno-economic system analysis with the respective I/O, the integration of system dynamics, and the iteration for conveyance of variables.

N79-33882/8 PC **A09**/MF **A01**
Boeing Computer Services, Inc., Seattle, Wash. Energy Technology Applications Div.
An Expanded System Simulation Model for Solar Energy Storage (Univac Operation Manual Revisions), Volume 2.
Final Report.
A. W. Warren. Aug 79, 198p NASA-CR-159602, DOE/NASA/0042-79/2-V-2
Contracts DEN3-42, EX-76-A-31-1026
Seri-2.

Additions or revisions of components of the SIMWEST program are provided for insertion into the manual used with the UNIVAC 1100 series computer.

N79-33883/6 PC **A21**/MF **A01**
Boeing Computer Services, Inc., Seattle, Wash. Energy Technology Applications Div.
SIMWEST: A Simulation Model for Wind and Photovoltaic Energy Storage Systems (Cdc User's Manual), Volume 1.
Final Report.
A. W. Warren, and A. W. Esinger. Aug 79, 486p NASA-CR-159607, DOE/NASA/0042-79/3-V-1
Contracts DEN3-42, EX-76-A-31-1026
Seri-2.

Procedures are given for using the SIMWEST program on CDC 6000 series computers. This expanded software package includes wind and/or photovoltaic systems utilizing any combination of five types of storage (pumped hydro, battery, thermal, flywheel, and pneumatic).

N79-33884/4 PC **A11**/MF **A01**
Boeing Computer Services, Inc., Seattle, Wash. Energy Technology Applications Div.
SIMWEST: A Simulation Model for Wind and Photovoltaic Energy Storage Systems (Cdc Program Descriptions), Volume 2.
Final Report.
A. W. Warren, R. W. Edsinger, and J. D. Burroughs. Aug 79, 247p NASA-CR-159608, DOE/NASA/0042-79/4-V-2
Contracts DEN3-42, EX-76-A-31-1026
Seri-2.

The computer programs for the CDC version of SIMWEST (1979 revision) are described. Macro flow charts and source code listings for each major program entity are presented.

ORNL/CSD-39 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.
Mathematical Modeling of Phase Change Processes for Latent Heat Thermal Energy Storage.
A. D. Solomon. Aug 79, 137p
Contract W-7405-ENG-26

The discussion is a meld of two areas moving boundary problems of phase-change processes and latent heat thermal energy storage. Each has come into its own in recent years. Interest in moving boundary problems had been relatively dormant from the mid 1950s until the early 1970s when new applications and techniques stimulated a broad and continuing research effort. Latent heat thermal energy storage (LHTES) concepts date back to the early 1950s but have only recently become attractive and worthy of consideration on economic grounds because of the expanding energy crisis. The discussion is in two parts. In the first some aspects of heat transfer and thermal energy storage are reviewed. Part 2 deals with mathematical modeling of phase-change processes and closes with a list of pertinent references. (ERA citation 04:051754)

SAND-79-8634 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
High Temperature Compatibility of Nitrate Salts, Granite Rock and Pelletized Iron Ore.
V. P. Burolla, and J. J. Bartel. Aug 79, 32p
Contract EY-76-C-04-0789

Under the direction of the Department of Energy, high-temperature (550 exp 0 C) thermal energy storage concepts are being studied for application with second-generation solar central receiver thermal power systems. The report evaluates the compatibility of the current choice of working fluids with common granite rock and a pelletized iron ore. Results indicate that the long-term stability of iron-ore pellets in binary mixtures of potassium and sodium nitrates is superior to granite rock-salt mixtures and salt systems without solid media. Corrosion of

the Inconel 600 vessels was observed. (ERA citation 04:051332)

11. MATERIALS

11A. Adhesives and Seals

AD-A075 554/6 PC **A03**/MF **A01**
General Electric Co Schenectady NY Microwave Tube Business Section
Ceramic-to-Metal Seal Technology.
Technical information series,
R. H. Bristow. Jan 66, 49p Rept no. R66ETI-2

The major applications for glass-to-metal and ceramic-to-mstal seals are found in the electrical industry where such seals serve the dual purpose of electrically isolating yet 'hermetically' sealing various portions of a device. The term 'hermetic', although widely used, is not yet capable of precise definition (ASTM Committee F-1, Sub-Committee V, is currently studying the problems of measuring and classifying leak rates in metallic-nonmetallic seals). In some applications, such as electrical feed-throughs for capacitors and transformers, a seal is merely required to be liquid or oil tight. In many more applications, such as lamps, vacuum and gas-filled electron tubes, space simulation chamber, etc., a seal must be gas-tight or, as this condition is more commonly referred to, vacuum tight. A vacuum-tight seal is generally considered to be one which, when tested on a helium-peaked mass spectrometer leak detector, shows a leakage rate of less than 10 to the -10 cc of air per second. It is this latter type of seal with which this report is primarily concerned. Although glass-to-metal seals serve admirably in many applications, there is a continually growing usage of ceramic-to-metal seals. Ceramic-to-metal seals possess a number of advantages and very few disadvantages when compared with their glass counterpart.

N79-32551/0 PC **A04**/MF **A01**
Avco Lycoming Div., Stratford, Conn.
Development of Spiral-Groove Self-Acting Seals for Helicopter Engines.
Final Report, 10 Jun. 1977 - 31 Dec. 1978.
M. Obrien. Jun 79, 62p NASA-CR-159622, LYC-79-25
Contract NAS3-20795
Subm-Sponsored in Part by Army Res. And Technol. Labs.

A spiral-groove, self-acting face seal was rig tested at advanced gas turbine operating conditions to determine wear and leakage rates. The spiral-groove, self-acting geometry was located in the rotating seal seat. Seal component wear induced by start-stop operation was measured after subjecting the test seal to 176 start-stop cycles. Wear occurring during normal operation was documented throughout a 75-hour endurance test. Seal air leakage was also measured. During endurance operation, the seal was subjected to operating conditions bounded by the values surface speed - 244 m/s (800 ft/sec), air pressure - 148 N/sq cm abs (215 psia), and air temperature - 622 K (660 F). The post-test condition of the seal components was documented. Wear data is presented in tabular form, while seal air leakage is presented graphically, as a function of pressure and speed.

N79-33325/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Plasma-Sprayed Zirconia Gas Path Seal Technology: A State-of-the-ART Review.
R. C. Bill. 1979, 17p NASA-TM-79273, AVRADCOM-TR-79-47
Conf-Presented at the Manufacturing Technol. Advisory Rev., Phoenix, Ariz., 21-25 Oct. 1979; Sponsored by the Soc. Of Manufacturing Engr.

The benefits derived from application of ceramic materials to high pressure turbine gas path seal components are described and the developmental backgrounds of various approaches are reviewed. The most fully developed approaches are those employing plasma sprayed zirconium oxide as the ceramic material. Prevention of cracking and spalling of the zirconium oxide under cyclic thermal shock conditions imposed by the engine operating cycle is the most immediate problem to be solved before implementation is undertaken. Three promising approaches to improving cyclic thermal shock resistance are described and comparative rig performance of each are reviewed. Advanced concepts showing potential for performance improvements are described.

11B. Ceramics, Refractories, and Glasses

AD-A075 138/8 PC **A02**/MF **A01**
Army Materials and Mechanics Research Center Watertown Ma
Carbon Impurity Effect on the Thermal Degradation of a Si3N4-Y2O3 Ceramic.
Final rept.,
Heinrich Knoch , and George E. Gazza. May 79, 12p Rept no. AMMRC-TR-79-27

The oxidation behavior of hot-pressed Si3N4.Y2O3 compounds (principally Si3Y2O3N4, N-melilite) was studied in air between 700 C and 1440 C. It is shown that carbon impurity strongly influences the thermal degradation of these compounds. Oxidation of carbon-containing materials in air at 1000 C leads to high weight gains, severe cracking, and complete destruction of the samples. Nominally carbon-free materials show good oxidation resistance without cracking. (Author)

AD-A075 481/2 PC **A03**/MF **A01**
Naval Research Lab Washington Dc
The Nature of Strength Controlling Machining Flaws in Ceramics.
Interim rept.,
R. W. Rice , and J. J. Mecholsky, Jr. 25 Sep 79, 33p Rept no. NRL-MR-4077

The nature of machining flaws introduced in a variety of glass, single crystal, and especially polycrystal bodies are reported, based on fractographic determination of such flaws as the source of mechanical failure. Particular attention is given to grinding where the anisotropy of strength due to the direction of grinding relative to the tensile axis is shown to be due primarily to a dual population of flaws of differing shapes. One set of flaws form approx. perpendicular and another parallel to the grinding direction. The latter flaws are typically substantially more elongated and often larger than the former and thus give lower strengths for stressing perpendicular to the direction of grinding. Sawing, sanding, and polishing are also shown to result in similar dual flaw populations. The character of flaws are examined as a function of the type of material and machining, as well as specimen size and shape. The latter suggests a limited strength-size effect due to machining flaws. However, the key findings are that machining flaws do not vary greatly with typical variations of machining or material parameters, e.g. composition, grain size, or hardness. (Author)

AD-A075 551/2 PC **A03**/MF **A01**
Honeywell Corporate Material Sciences Center Bloomington Mn
Effect of Workpiece Properties on Grinding Forces in Polycrystalline Ceramics,
Technical rept.,
B. G. Koepke , and R. J. Stokes. Jun 79, 41p Rept nos. 47502, TR-7
Contract N00014-69-C-0123

Grinding forces have been measured on a number of polycrystalline ceramics and correlations between the forces and workpiece properties have been attempted in an effort to gain insight into mechanisms of chip formation. The closest correlations were with a parameter related to the indentation fracture characteristics of each workpiece. This suggest that a major mechanism of chip formation during multipoint abrasive machining of ceramics is fracture resulting from the plastic indentation of the workpiece by the abrasive grains. Griding forces during up and down grinding were different but both correlated with the indentation fracture parameter when the communication characteristics of the chips during down grinding were accounted for. (Author)

GA-A-15270 PC **A03**/MF **A01**
General Atomic Co., San Diego, CA.
Property Changes in Graphite Irradiated at Changing Irradiation Temperature.
R. J. Price, and G. Haag. Jul 79, 42p
Contract AT03-76ET35300

Design data for irradiated graphite are usually presented as families of isothermal curves showing the change in physical property as a function of fast neutron fluence. In this report, procedures for combining isothermal curves to predict behavior under changing irradiation temperatures are compared with experimental data on irradiation-induced changes in dimensions, Young's modulus, thermal conductivity, and thermal expansivity. The suggested procedure fits the data quite well and is physically realistic. (ERA citation 04:052021)

N79-33258/1 PC **A07**/MF **A01**
United Technologies Research Center, East Hartford, Conn.
Development of Sialon Materials.
Final Report, Jun. 1975 - Sep. 1979.
G. K. Layden. Sep 79, 145p NASA-CR-159675, R79-912997-39
Contract NAS3-19712

Cold pressing and sintering techniques were used to produce ceramic test specimens in which the major phase was either Si3N4 or a solid solution having the beta Si3N4 structure. Additional components were incorporated to promote liquid phase sintering. Glass and/or crystalline phase were consequently retained in boundaries between Si3N4 grains which largely determined the physical properties of the bodies. Systems investigated most extensively included R-Si-Al-O-N (R = rare earth element) Zr-Si-Al-O-N, Y-Si-Be-O-N, and R1-R2-Si-O-N. Room temperature and 1370 C modulus of ruptured, 1370 C creep, and oxidation behavior are discussed in terms of phase relationships in a parent quinery, and relavent oxide systems.

11C. Coating, Colorants, and Finishes

AD-A075 483/8 PC **A04**/MF **A01**
Boeing Aerospace Co Seattle Wa Navy Systems and Advanced Projects Div
Coating System Studies for the Corrosion Protection of HY 130 Steel.
Final rept.,
D. W. Martin , D. D. Miller , and W. L. Engstrom. Jun 74, 68p Rept no. D180-18126-1
Contract N00600-69-C-0618
HYSTU Plan Number 303.

The objectives of this program were to study the effects of aluminum and zinc metal substrates with a passive overcoat on the corrosion fatigue life of HY 130 in a marine environment and to develop a shipboard repair process for hydrofoil strut and foil external coatings. Conclusions were reached about the effectiveness of the active metal substrates in protecting HY 130. A repair material and procedure were recommended. (Author)

N79-32266/5 PC **A04**/MF **A01**
Hughes Aircraft Co., Culver City, Calif. Advanced Technology Lab.
Feasibility Study of Silicon Nitride Protection of Plastic Encapsulated Semiconductors.
Final Report, 15 Jul. 1978 - 30 Jun. 1979.
J. W. Peters, T. C. Hall, J. J. Erickson, and F. L. Gebhart. 30 Jun 79, 58p NASA-CR-161302, HAC-REF-1954
Contract NAS8-33075

The application of low temperature silicon nitride protective layers on wire bonded integrated circuits mounted on lead frame assemblies is reported. An evaluation of the mechanical and electrical compatibility of both plasma nitride and photochemical silicon nitride (photonitride) passivations (parallel evaluations) of integrated circuits which were then encapsulated in plastic is described. Photonitride passivation is compatible with all wire bonded lead frame assemblies, with or without initial chip passivation. Plasma nitride passivation of lead frame assemblies is possible only if the chip is passivated before lead frame assembly. The survival rate after the environmental test sequence of devices with a coating of plasma nitride on the chip and a coating of either plasma nitride or photonitride over the assembled device is significantly greater than that of devices assembled with no nitride protective coating over either chip or lead frame.

N79-33260/7 PC A03/MF A01
Avco Corp., Lowell, Mass. Specialty Materials Div.
A Study of the Deposition of Carbide Coatings on Graphite Fibers.
R. J. Suplinskas, and T. W. Henze. Sep 79, 50p NASA-CR-159133
Contract NAS1-15374

The chemical vapor deposition of boron carbide and silicon carbide on graphite fibers to increase their electrical resistance was studied. Silicon carbide coatings were applied without degradation of the mechanical properties of the filaments. These coatings typically added 1000 ohms to the resistance of a filament as measured between two mercury pools. When SiC-coated filaments were oxidized by refluxing in boiling phosphoric acid, average resistance increased by an additional 1000 ohms; in addition resistance increases as high as 150 K ohms and breakdown voltages as high as 17 volts were noted. Data on boron carbide coatings indicated that such coatings would not be effective in increasing resistance, and would degrade the mechanical properties.

11D. Composite Materials

AD-A075 082/8 Not available NTIS
Pennsylvania State Univ University Park Dept of Materials Science and Engineering
Crystallography and Microstructure of Directionally Solidified Oxide Eutectics,
W. J. Minford , R. C. Bradt , and V. S. Stubican. 16 Dec 77, 4p ARO-14069.3-MS
Grant DAAG29-77-G-0057
Presented at the Annual Meeting of the American Ceramic Society (79th), Chicago, IL, 27 Apr 77.
Availability: Pub. in Jnl. of the American Ceramic Society, v62 n3-4 p154-157 Mar-Apr 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 083/6 Not available NTIS
Pennsylvania State Univ University Park Materials Research Lab
Directional Solidification of SiC-B4C Eutectic: Growth and Some Properties,
Jen-Der Hong , K. E. Spear , and V. S. Stubican. 1 Mar 79, 10p ARO-14069.2-MS
Grant DAAG29-77-G-0057
Availability: Pub. in Materials Research Bulletin, v14 n6 p775-783 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 279/0 PC A05/MF A01
Bell Helicopter Textron Fort Worth Tx
Filament Winding Precision Resin Impregnation System.
Final rept. Aug 77-Mar 79,
Richard R. Zeits . Mar 79, 96p USAAVRADCOM-TR-79-15
Contract DAAJ01-77-C-0777
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This report presents the results of a program to develop and evaluate a precision resin impregnation system. The program objective was to develop a resin impregnator capable of consistently wetting S-glass, Kevlar and graphite roving with resin controlled within plus or minius 2% by weight. The tests conducted demonstrate the ability of the developed equipment to meet resin content control objectives. The effect of the process variables of fiber temperature, resin temperature and winding speed on impregnation quality were evaluated. Short beam shear tests and microstructure analysis were the primary evaluation tests conducted. (Author)

N79-32277/2 PC A03/MF A01
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Elevated-Temperature Application of the Iitri Compression Test Fixture for Graphite/Polyimide Filamentary Composites.
B. B. Raju, C. J. Camarda, and P. A. Cooper. Sep 79, 48p NASA-TP-1496, L-12704

Seventy-nine graphite/polyimide compression specimens were tested to investigate experimentally the IITRI test method for determining compressive properties of composite materials at room and elevated temperatures (589 K (600 F)). Minor modifications were made to the standard IITRI fixture and a high degree of precision was maintained in specimen fabrication and load alignment. Specimens included four symmetric laminate orientations. Various widths were tested to evaluate the effect of width on measured modulus and strength. In most cases three specimens of each width were tested at room and elevated temperature and a polynomial regression analysis was used to reduce the data. Scatter of replicate tests and back-to-back strain variations were low, and no specimens failed by instability. Variation of specimen width had a negligible effect on the measured ultimate strengths and initial moduli of the specimens. Measured compressive strength and stiffness values were sufficiently high for the material to be considered a usable structural material at temperatures as high as 589 K (600 F).

N79-32280/6 PC A03/MF A01
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Scanning Electron Microscopy of Fracture Surfaces of Carbon Composite Materials.
W. G. J. Hart. Jan 79, 30p NLR-TR-76035-U
Subm-Sponsored by Netherlands Agency for Aerospace Programmes (Nivr).

A macroscopic and microscopic study of composite fracture surfaces was performed in order to relate the fracture surface characteristics to the fracture mechanisms and types of loading involved. The microscopic study was performed on carbon composite fracture surfaces using the scanning electron microscope (SEM). To facilitate interpretation of the photographs, a theoretical treatment of the possible fracture processes expected to occur under the different loading conditions is presented. Results show that the SEM is a useful tool for examining fracture surface characteristics of composite materials failing under different loading conditions.

N79-32281/4 PC A03/MF A01
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Residual Strength Properties of Carbon/Epoxy Composite Materials.
W. G. J. Hart. Jan 79, 42p NLR-TR-77039-U
Contract NIVR-1744

Fatigue tests on unidirectional carbon/epoxy composite materials were performed to investigate whether previous fatigue loading influences the residual static strength. Residual strength tests were carried out on (0, + or - 45) sub 2s and (+ or - 45) sub 2s laminates, while for the (0, + or - 45) sub 2s laminate, the influence of previous tensile fatigue loading on the residual strength was investigated. Results show that the fatigue properties under tensile fatigue loading of unidirectional carbon/epoxy composite materials are excellent provided that the load introduction does not result in shear stresses.

N79-32284/8 PC A05/MF A01
National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Technology Div.
Determination of the Thermal Conductivity of Carbon Fiber Reinforced Plastic Sheet Material.
D. Vandenassem, and D. H. W. Daniels. Apr 79, 87p NLR-TR-77113-U
Contract NIVR-1779

The determination of the thermal conductivity of anisotropic carbon fiber reinforced plastic (CFRP) sheet material (thickness 0.3 mm) is described. For this purpose, two measuring set-ups were constructed, one for measurements in the plane of the sample and one for the measurement normal to the sheet plane. For the sheet material considered, the obtained measurement results show that in-plane : k = 6.4 (+ or -) 1.0 (+ or -) W/mK and that normal to the sheet k = 0.61 (+ or -) 0.18 W/mK. It is argued that modification of the apparatus for the in-plane measurements will give more accurate results. For the normal direction, however, improvement of the results is unlikely at the moment.

N79-32285/5 PC A03/MF A01
National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Technology Div.
Thermal Conductance Measurement of Honeycomb Sandwich Panels with Carbon Fiber Reinforced Plastic Face Sheets.
D. Vandenassem, and D. H. W. Daniels. 3 Aug 78, 40p NLR-TR-78061-U
Contract NIVR-1779

The thermal conductance, normal to the plate direction, of 14 honeycomb sandwich material specimens with carbon fiber reinforced plastic face sheets was measured. Two different measurements set-ups were assembled; in one a guard specimen can be tested, in the other, the specimen is unguarded, so that corrections have to be made for the radiative heat exchange between the specimen and its environment. Two different face sheet thicknesses (100 micro m and 150 micro m) were used in the measurements, but no quantitative effect could be observed for the influence of thickness on the thermal conduction. An overall value for the conductivity, normal to the plate, was determined at about 326 K: C = 24.0 + or - 0.8 W/m sq x K, with a thermal gradient: dC/dT = (9.2 + or - 1.1) x 0.01 W/m sq x K sq. The indicated uncertainties are root-mean-square values.

N79-32286/3 PC A02/MF A01
Research Inst. of National Defence, Stockholm (Sweden).
Nondestructive Measurement of Fiber Direction and Fiber Amount in Carbon Fiber Reinforced Laminates.
R. Soederqvist, and I. Schill. May 79, 18p FOA-C-20306-F9

The X-ray diffraction patterns of the 002 graphite planes in carbon fiber reinforced plastics were measured. The intensity at azimuthal angle 0 from fiber normal was used for measurement of fiber amount and the azimuthal intensity distribution was used for measurement of fiber direction. Results show that with Mok alpha radiation, thickness from 0.5 mm to 15 mm can be measured with a precision of 2 percent as regards fiber amount and within 1 deg as regards fiber direction.

N79-32287/1 PC A03/MF A01
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Residual Strength of (0, + or - 45) sub S and (+ Or - 45, 0) sub S Carbon/Epoxy Laminates.
W. G. J. Hart. 15 Jan 79, 32p NLR-TR-77115-U
Contract NIVR-1744

Residual strength tests were carried out on (0, + or - 45)sub s and (+ or - 45, 0)sub s carbon/epoxy laminates containing holes or cracks. The influence of specimen width on the residual strength was investigated for (0, + or - 45)sub s carbon/epoxy specimens. Results show that the residual strength is independent of the laminate stacking sequence for simulated cracks. The residual strength of (+ or - 45, 0)sub s and (0, + or - 45)sub s carbon/epoxy laminates containing holes is highest for the latter laminate configuration. Residual strength tests on (0, + or - 45)sub s carbon/epoxy specimens of different widths indicate that the residual strength behavior (corrected for finite width) is independant of the specimen width.

N79-32288/9 PC A03/MF A01
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Environmental Fatigue Crack Propagation in Metal/Composite Laminates.
Interim Report.
R. J. H. Wanhill. 15 Jan 79, 26p NLR-TR-77122-U, IR-1
Contract NIVR-1806

Flight simulation fatigue crack propagation tests with gust spectrum loading were carried out on 2024-T3/carbon-epoxy, 7475-T761/carbon-epoxy, and Ti-6Al-4V/carbon-epoxy laminates with nominal weight savings of 30 percent as compared to equivalent 2024-T3 panels. The performance of the 2024-T3/carbon-epoxy laminates was much superior to those of the other material combinations. Overall, there was a fairly strong effect noted when changing from an environment of normal air to an air plus water spray environment. Probable reasons for the strong effect are discussed.

N79-32289/7 PC A03/MF A01
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.

Residual Strength of Kevlar-Carbon/Epoxy Hybrid Composite Materials.
W. G. J. Hart. 16 Jan 78, 27p NLR-TR-78008-U
Contract NIVR-1824

Residual strength tests were carried out on various Kevlar 49/carbon/epoxy laminate configurations consisting of a carbon/epoxy core with face sheets of Kevlar 49 fabric. The influence on the residual strength of fatigue loading notched specimens was investigated. Test data was then compared with data from similar tests on (0, + or - 45)sub s carbon/epoxy composite materials and aluminum alloys 2024-T3 and 7075-T6. Results show that the Kevlar fabric, with a high fracture strain, does not reduce the notch sensitivity of carbon/epoxy composites. Although 2024-T3 and 7075-T6 sheet material are less notch sensitive than composites for small defects, the absolute residual strength of composite materials remains higher. The fatigue properties of the notched laminates are also superior to those of 2024-T3 and 7075-T6, at least as far as constant amplitude tests are concerned.

N79-32290/5 PC **A02**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Residual Strength Characteristics of Composite Reinforced Stiffened Panels.
G. Bartelds. 17 Feb 78, 22p NLR-TR-78025-U
Contract NIVR-1807

The effect of selective reinforcement, using unidirectional carbon-epoxy composites, on the residual strength of stiffened tensile panels of 7075-T6 aluminum alloy was investigated. A series of twelve specimens with varying degrees of stiffener reinforcement and containing various degres of initial damage were statically loaded to failure. The results can be interpreted in terms of the specific residual strength, that is, the ratio of panel failure load per unit width and panel mass per unit area. The specific residual strength increases with composite content of the stiffener and reaches a value for all-composite stiffening that is twice the value for an all-metal panel.

N79-32291/3 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Investigation of the Length Dependency of Carbon Fibers and the Related Unidirectional Composite Strength.
W. G. J. Hart. Apr 78, 38p NLR-TR-78050-U
Contract NIVR-1744

To relate the strength of unidirectional composites to the strength of the constituent components, tensile tests were carried out on single carbon fibers of different lengths. Tensile tests on unidirectional and (0,90) carbon/epoxy were performed in order to examine whether the length/strength dependency of brittle fibers is also found in composite materials. Results show that the fiber strength strongly depends on the fiber length. However, the application of the Rule of Mixtures is shown to be debatable. The observed length/strength dependency in unidirectional carbon/epoxy specimens can be attributed to specimen splitting in the longer specimen, leading to premature failure. The application of a 90 deg layer in order to prevent splitting was not successful. Although the scatter in strength decreased, the experimental results were obscured by grip failures.

N79-33259/9 PC **A02**/MF **A01**
General Dynamics/Convair, San Diego, Calif.
Feasibility Study on the Development of Tough, Moisture-Resistant Laminating Resins.
Final Report.
R. A. Brand, and E. S. Harrison. Oct 79, 24p
NASA-CR-3185, CASD-NAS-012
Contract NAS1-15111

The potential of cyanate resins as replacement for epoxy resins in composites with graphite fiber reinforcement was investigated in an effort to provide improved moisture resistance and toughness in laminating systems at a projected cost, handleability, and processing requirements equivalent to 400 K (260 F) curing epoxies. Monomer synthesis, formulation, blending, resin preparation, catalysis studies, prepreg preparation, laminate fabrication, and testing are discussed. A graphite fiber reinforced laminate was developed with 95 percent retention of the original 363 K (180 F) flexural strength and 70 percent retention of the 363 K (180 F) short beam shear strength after 500 hour exposure to 95 + 7 relative humidity at 324 K (120 F).

PB80-104417 Not available NTIS
National Bureau of Standards, Washington, DC.
Storage Stability of Dental Composites.
Final rept.,
G. M. Brauer, N. Petrianyk, and D. J. Termini.
Aug 79, 10p
Sponsored in part by Army Medical Research and Development Command, Washington, DC.
Pub. in Jnl. of Dental Research 58, n8, p1791-1800, Aug 79.

The deterioration of composites based on Bis-GMA-diluent and cured by peroxide-amine systems was studied. Properties of composites, cured from components stored at various temperatures were determined. On storage at 60C, the catalyst containing component of a paste-paste system partially hardens within one day and the other paste within one month. Stored for 6 years at 5C the pastes do not cure. Components of powder-liquid formulations do not harden in their containers when stored at 60C or 45C, but after prolonged exposure a gradual increase in hardening time and reduction in tensile and compressive strength of the composite occurs. The shelf life of the peroxide-coated powder is shorter than the amine-containing monomer. Liquids stored at elevated temperatures for prolonged periods when mixed with ambient-aged powders yield resins with satisfactory properties. No improved shelf life is obtained by substituting (1) polyethylene for brown glass containers, (2) aerating the monomer prior to storage, (3) other diluents for TEGDMA, (4) equimolar concentration of dimethyl-p-toluidine, dimethylaminophenylacetic acid or its methyl ester for dimethyl-sym-xylidine. Because of the better shelf-life, powder-liquid formulations should be used when the composite may be subjected to temperatures above 45C.

11F. Metallurgy and Metallography

AD-A075 091/9 Not available NTIS
Illinois Univ At Urbana-Champaign
The Stress-Corrosion Cracking of Copper Alloys,
E. N. Pugh. 1979, 33p ARO-12062.3-MS
Grant DAHC04-74-G-0127
Availability: Pub. in Stress Corrosion Research, p177-208 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 134/7 PC **A03**/MF **A01**
Rock Island Arsenal II Engineering Directorate
An Evaluation of Processes for the Blackening of Precipitation-Hardened Stainless Steels.
Technical rept.,
Joseph T. Menke. Jun 79, 29p Rept no. SARRI-EN-TR-79-01

Precipitation-hardened stainless steels (corrosion-resistant materials with excellent mechanical properties) require dark, nonreflective finishes to be useful for most military applications. Work involving such finishes was conducted to determine which of the various blackening processes could be used for these materials without decreasing their inherent corrosion resistance. Corrosion tests were conducted on coated and uncoated 17-4, 17-7, 14-8Mo, and AM350 alloys in the annealed and precipitation-hardened condition. The blackening processes evaluated included black chromium plating, zinc phosphating, molten sodium dichromate, and alkaline-oxidizing treatmentds. Activated and passivated specimens were used as controls in the corrosion tests. Potentiostatic, potentiodynamic, and 5% salt spray (astm-b117) tests were used to evaluate the various specimens. Salt-spray tests showed that maximum corrosion protection was provided by black chromium and zinc phosphate coatings. All corrosion tests showed that black coatings produced by the alkaline-oxidizing process provided varying degrees of corrosion resistance, dependent upon the alloy or thermal treatment used, and that coatings produced by the molten sodium dichromate treatment provided poor corrosion protection. Black coatings on the 14-8Mo and AM350 alloys exhibited the best corrosion resistance. (Author)

AD-A075 167/7 PC **A02**/MF **A01**
United States Steel Corp Monroeville Pa Research Lab
Effect of Purity on Reliability Characteristics of High-Strength Steel.
Interim technical rept. no. 2,
S. R. Novak , and H. M. Reichhold. 1 May 76, 24p GIDEP-E136-1643
Contract F33615-75-C-5137

Three vacuum-induction-melted high-purity electrodes have been successfully vacuum-arc-remelted and forged to slab. The high-purity slabs have now been rolled to 1-inch-thick plates and the plates have been heat-treated and the mechanical properties evaluated. Three kinds of high-purity steels were successfully produced. For each of the three high-purity steels, the level of nitrogen content was 20 parts per million (ppm) or less than 0.002%; the specific levels of the phosphorus, sulfur, and oxygen content were each generally less than 10 ppm or 0.001%. (Author)

AD-A075 244/4 PC **A03**/MF **A01**
Army Armament Research and Development Command Dover Nj Fire Control and Small Caliber Weapon Systems Lab
Sintering Cycle Influence on P/M Steel Forgings' Dynamic Properties.
Final rept.,
Andrew Crowson. Aug 79, 37p ARSCD-TR-79008, AD-E400 342

The effects of sintering environments and their respective parameters on the dynamic properties of P/M steel forgings have been determined. Compacted preforms were sintered from 10 to 90 minutes over a range of temperatures (1100-1370 C) in inert, vacuum, and reducing atmospheres. The final oxide content was found to vary exponentially with sintering time, sintering temperature, and gas flow-rate regardless of the type of atmosphere used. Reduction of the metal oxides was basically controlled by two factors: (1) carbon, and (2) elevated temperature. Two levels of oxide reduction were evident. The initial level involved a reduction of the majority of the metal oxides (iron, molybdenum, and nickel oxides), whereas the secondary level resulted in a slow reduction of the more thermodynamically stable oxides of manganese and chromium. Elongation, reduction in area, and impact energy values showed a corresponding increase with decreasing oxide content.

AD-A075 251/9 PC **A07**/MF **A01**
Naval Postgraduate School Monterey Ca
Investigation of Welding Thermal Strains in High Strength Quenched and Tempered Steel.
Master's thesis,
Mark D. Lipsey. Jun 78, 132p

Previous studies of transient thermal strains during welding of high strength quenched and tempered steels are discussed. Data on the transient strain and temperature response during welding experiments on HY-130 and low carbon steel are presented. The experiments consisted of unrestrained, multipass, butt welds in one inch thick plates. The experimental results are compared to analytical predictions by the MIT computer program for the one dimensional analysis of thermal stresses and metal movement during welding. Results indicate that the program accurately predicts the temperature distribution present during welding. However, the program fails to accurately predict the transient strain response except far from the weld line where transverse strains are insignificant. Therefore, the one-dimensional program has limited usefulness for predicting response in thick sections. Recommendations are made which include a comparison of results with a two-dimensional computer analysis and a metallurgical characterization of both the weld metal and the base metal near the weld. (Author)

AD-A075 267/5 PC **A03**/MF **A01**
Kentucky Univ Lexington Dept of Metallurgical Engineering and Materials Science
A Study of the Electroplastic Effect in Metals.
Final technical rept. 1 Jan 77-31 May 79,

Hans Conrad , and Kenji Okazaki. 31 Jul 79, 44p
AFOSR-TR-79-0988
Grant AFOSR-77-3203

The effects of high density, direct current pulses (100 to 1000 A/sq. mm for periods of 55-120 microsecs) on the flow stress determined in an Instron tensile testing machine were studied in a number of polycrystalline metals representing various crystal structures (Pb, Sn, Fe and Ti), with most attention being focused on Ti. The current pulses produced a decrease in the flow stress delta (o sub p) in all four metals. The work on Ti indicated that delta (o sub p) contains a contribution in addition to heating and pinch effects. This contribution (the electroplastic effect) increased significantly with current density, interstitial content and temperature (77-300K), to a lesser degree with strain, but no change was detected for a 25 fold increase in strain rate. Computer calculations of the dynamic stress changes associated with the approximately sinusoidal current-time pulses employed here yielded a contribution due to the electron-dislocation interaction (for a current density of 5000 A/sq mm at 300K) which was 32% of delta (o sub p). A model is proposed for the electroplastic effect which is based on theoretical considerations that the current flow exerts a force on the dislocations which adds to the applied force pushing a dislocation against obstacles. Complementary studies were performed on: (a) the decremental unloading method for determining the internal stress in metals, (b) the effects of temperature, gain size and interstitial content on the flow stress of Ti and (c) plastic instability in Ti sheet. (Author)

AD-A075 285/7 PC **A03/MF A01**
Southwest Research Inst San Antonio Tex
Fatigue-Microcrack Behavior under the Influence of Surface Residual Stresses.
Interim rept. 1 Aug 78-31 Jul 79,
J. E. Hack , and G. R. Leverant. 1 Oct 79, 41p
Contract N00014-78-C-0674

Direct observations of the surface crack opening displacement (SCOD) of surface microcracks have been performed on samples of Ti-6Al-4V under both cyclic and static loading conditions. The observations were conducted in a specially-designed loading stage in-situ in a scanning electron microscope. SCOD's of cracks as small as 7 microns in surface length have been studied with this technique. Preliminary results have indicated that crack opening is purely elastic for the strain range studied although a significant residual opening is apparent when no load is applied. Concurrent with the experimental efforts, an analytical approach has been developed to predict SCOD for both elastic and plastic loading conditions based on crack geometry. The correlation between predicted SCOD values and independent data for microcracks is excellent. The approach will be modified to account for the influence of an imposed residual stress field and compared to experimental results on microcrack behavior. (Author)

AD-A075 293/1 Not available NTIS
Hughes Research Labs Malibu Ca
Theory of Interphase and Antiphase Boundaries in F.C.C. Alloys,
Ryoichi Kikuchi , and John W. Cahn. 18 Nov 78, 17p ARO-13252.5-P
Contract DAAG29-76-C-0026
Abstract in French and German.
Availability: Pub. in Acta Metallurgica, v27 p1337-1353 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 305/3 Not available NTIS
Brown Univ Providence R I Div of Engineering
Optical Properties of Amorphous Metallic Gold-Silicon Alloys,
E. Hauser , R. J. Zirke , J. Tauc , J. J. Hauser , and S. R. Nagel. 11 Sep 78, 6p ARO-13723.8-P
Grant DAAG29-76-G-0221
Prepared in cooperation with Chicago Univ., IL, and Bell Telephone Labs., Murray Hill, NJ. Sponsored in part by Grant NSF-DMR77-09931.
Availability: Pub. in Physical Review B, v19 n12 p6331-6336, 15 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 344/2 PC **A02/MF A01**
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
Corrosion Protection of 416 Stainless Steel Firing Probes.
Memorandum rept.,
S. Tauscher. Jul 79, 20p ARLCB-MR-79017, AD-E440 044

The effectiveness of several protective coatings in resisting pitting corrosion in 416 stainless steel 152mm firing probes was investigated using an accelerated corrosion test. Test specimens with selected metallic and non-metallic coatings were immersed in ferric chloride and examined periodically for damage. This report concludes that on the basis of these tests, the non-metallic coatings investigated generally provided better resistance to corrosive attack than the metallic coatings investigated. (Author)

AD-A075 349/1 PC **A04/MF A01**
Naval Research Lab Washington Dc
Structural Integrity of Water Reactor Pressure Boundary Components.
Quarterly progress rept. Apr-Jun 79,
F. J. Loss. 28 Sep 79, 70p NRL-MR-4064, NUREG-CR-0943
Contract NRC-RES-79-103

This report describes research progress in a continuing program to characterize materials properties performance with respect to structural integrity of light water reactor pressure boundary components. progress for this reporting period is summarized in the following areas: (a) postirradiation fracture toughness of IAEA coordinated program steels, (b) Charpy V-notch ductility trends of submerged arc weld deposit with cyclic postirradiation annealing and reirradiation treatments, (c) J-R curve characterization of irradiated submerged arc weld deposits, and (d) evaluation of critical factors in cyclic crack growth rate studies in a pressurized water reactor environment. (Author)

AD-A075 473/9 PC **A05/MF A01**
Gibbs and Cox Inc New York
Significance and Control of Lamellar Tearing of Steel Plate in the Shipbuilding Industry.
Final technical rept.,
J. Sommella. May 79, 85p 18521(1-146), SSC-290
Contract DOT-CG-74355-A

Lamellar tearing is a separation in the parent or base metal caused by through-thickness strains. These strains are usually induced by weld metal shrinkage under conditions of high restraint. This manual provides specific recommendations for controlling lamellar tearing in the types of steels used in the construction of ships and offshore platforms. A briefdescription of the characteristics and mechanism of lamellar tearing shows that for lamellar tearing to occur there must be a critical combination of material susceptibility, and welding procedures and joint design which permit the development of high through-thickness strains. Tee (T) and corner joints, used extensively in ships and offshore structures, are the two basic joint configurations most susceptible lamellar tearing. However, the incidence of lamellar tearing has been extremely rare in shipbuilding. The problem of lamellar tearing is considerably more significant in mobile and fixed offshore drilling platforms which use thick plates in highly restrained T-and cruciform joints. The factors which contribute to and influence lamellar tearing are grouped into three categories: joint design, material selection and fabrication procedures. For each parameter recommendations are presented for reducing the risk of lamellar tearing. Inquiries made to the major ship classification societies indicate that the most successful and cost-effective method of preventing lamellar tearing is the use of steels with improved through-thickness (Z-direction) properties at susceptible connections. Methods for the post-welding detection and repair of lamellar tears are reviewed as are the test procedures developed to date for determining the susceptibility of steel plates to lamellar tearing. (Author)

AD-A075 506/6 PC **A04/MF A01**
Naval Research Lab Washington Dc
Fatigue Crack Growth of A508 Steel in High-Temperature, Pressurized Reactor-Grade Water,
W. H. Cullen, Jr. , V. Provenzano , K. J. Torronen , H. E. Watson , and F. J. Loss. 28 Sep 79, 58p
Rept nos. NRL-MR-4063, NRL/NUREG-CR-0969

Fatigue crack growth tests of A508-2 pressure vessel steel have been conducted at two test temperatures (93 degrees C and 288 degrees C) using a variety of constant amplitude waveforms. The load ratios were either 0.1 or 0.125, and the water chemistry was carefully monitored and controlled so as to simulate the nominal pressurized water reactor chemistry. The test procedures are described, and an examination of all the data indicates that the results fall into one of two rather clearly defined categories. One band of data, termed 'low', lies close to or essentially on, the ASME Section XI Code air environment default line. The other band of data, termed 'high', resides approximately midway between the ASME Sec. XI air and water environment default lines. The two bands of data are the result of certain combinations of the waveform and temperature variables listed above, and are determined by the following rules: (1) a ramp time in excess of one second is needed to obtain the high crack growth rate; and (2) the application of a hold time, together with a high temperature, serves to depress a normally high crack growth rate test (i.e. one with a long ramp time) and force it into the low category. A hydrogen embrittlement model is used as a basis for the explanation of this behavior. During the longer ramp times (approximately one second) hydrogen, formed by aqueous hydrolysis, diffuses into the plastic zone, resulting in local embrittlement.

AD-A075 518/1 PC **A03/MF A01**
Illinois Univ at Urbana-Champaign Dept of Metallurgy and Mining Engineering
Phase Changes in the Niobium-Hydrogen System. I. Accommodation Effects during Hydride Precipitation.
Technical rept.,
B. J. Makenas , and H. K. Birnbaum. 1 Jul 79, 35p
Contract N00014-75-C-1012

The accommodation effects which accompany hydride precipitation were studied in the Nb-H system using T.E.M. Elastic accommodation and punching of prismatic dislocation loops in the solid solution matrix were observed on precipitation. The reversibility of the plastic accommodation processes was studied. Dislocation generation and motion in the hydride was observed during reversion. These observations were related to the volume changes due to hydride formation and to the thermodynamics of the phase change. Direct evidence for the inhibition of hydride precipitation due to trapping at O and N interstitials is presented. (Author)

AD-A075 539/7 PC **A02/MF A01**
Sandia Labs Livermore Ca Materials Development Div
Corrosion Resistance of Zinc-Nickel Plated U-0.75 Ti,
J. W. Dini , and H. R. Johnson. Sep 79, 21p Rept no. SAND79-8041
Contracts DE-AC04-76DP00789, MIPR T. 311-1005

As part of a program for the U. S. Army directed at improving the corrosion performance of U-0.75 Ti, specimens were coated with Zn-10 Ni alloy electroplate and then subjected to various corrosion tests. This work reveealed that the Zn-Ni coatings provided good protection for U-0.75 Ti in salt fog and in non-sealed moist-nitrogen systems. In sealed, moist-nitrogen environments the Zn-Ni coatings deteriorated quickly and provided no protection. Some plating with Zn alone, using some of the new non-cyanide plating solutions, was also attempted, but the results were inconsistent. (Author)

FE-1784-45 PC **A10/MF A01**
Metal Properties Council, Inc., New York.
Program to Discover Materials Suitable for Service under Hostile Conditions Obtaining in Equipment for the Gasification of Coal and Other Solid Fuels. Quarterly Progress Report, July 1--September 30, 1978.
A. O. Schaefer. 3 Jan 79, 220p

Contract EX-76-C-01-1784

Sixty-one alloys have been approved for testing in phase 1 involving high temperature corrosion experiments and specimen exposures in coal gasification pilot plants and some aqueous corrosion testing. Erosion–corrosion testing is also reported. Detailed results of stress-rupture tests at various temperatures on 16 alloys are given. (ERA citation 04:050976)

N79-32324/2 PC **A02**/MF **A01**
Pratt and Whitney Aircraft Group, West Palm Beach, Fla. Government Products Div.
Low Cycle Fatigue Properties of Mar-M-246 HF in Hydrogen.
Final Report.
J. R. Warren. Jun 79, 23p NASA-CR-161296, FR-11852
Contract NAS8-33109

The transverse, low cycle fatigue properties were determined for directionally solidified and single crystal samples of a cast nickel-base alloy proposed for use in space propulsion systems in pure or partial high pressure hydrogen environments at elevated temperatures. The test temperature was 760 C (1400F) and the pressure of the gaseous hydrogen was 34.5 MPa (5000 psig). Low cycle fatigue life was established by strain controlled testing using smooth specimens and a servohydraulic closed-loop test machine modified with a high pressure environmental chamber. Results and conclusions are discussed.

N79-32325/9 PC **A03**/MF **A01**
Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
Evaluation of Candidate Metals in a Simulated Space Shuttle Main Engine Environment for Application as Turbine Blade Dampers.
Final Report.
L. H. Caveny, and S. O. Morris. May 79, 37p NASA-CR-161299, MAF-1436
Contract NAS8-33102

The high-pressure pumps for the space shuttle main engine are driven by combustion products which are 50 percent H2 and 50 percent H2O (by weight). The Haynes alloy 188, used in the dampers, experienced erosion. The erosion producing characteristics of wet H2 were evaluated using a controlled environment produced by a ballistic compressor. Four candidate materials were evaluated: H-188, A-286, Pt/Rh and Rh. Rh was clearly the most erosion resistant. Comparisons with AISI 4340 and Fe specimens of known uniformity indicate that metallurgical defects in the candidate materials are primary contributors to the higher than usual erosion.

N79-32346/5 PC **A06**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Quantitative Models of Hydrogen Induced Cracking in High Strength Steel.
H. P. Vanleeuwen. 5 Jun 78, 103p NLR-MP-78018-U
Subm-Submitted for Publication.

Hydrogen embrittlement models are summarized. The pressure model, the adsorption model, the decohesion model, and the dislocation transport model, potentially applicable to high strength steel, are discussed in more detail. Analyses concerning the effect of stress on hydrogen solubility, embrittlement by adsorbed hydrogen, crack propagation in a gaseous hydrogen environment, crack propagation due to internal hydrogen embrittlement, and microcracking at the decohesion enclave are summarized. The prediction of the threshold stress intensity for external hydrogen embrittlement cracking on account of lattice decohesion as well as hydrogen diffusion in the near crack tip stress field and hydrogen transport by moving dislocations are also reviewed. The pros and cons of the various crack initiation models along with their limits in materials screening applications are discussed in an extended summary of conclusions.

N79-32347/3 PC **A05**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Quantitative Models of Hydrogen Embrittlement in High Strength Steel.
H. P. Vanleeuwen. Jun 79, 85p NLR-MP-78024-U
Conf-Presented at Seminar, Ontario, Sep. 1978.

Hydrogen embrittlement models are summarized. The pressure model, the adsorption model, the decohesion model, and the dislocation transport model, potentially applicable to high strength steel, are discussed in more detail. Various analyses concerning the stress effect on solubility, crack initiation and propagation in material exposed to external hydrogen, hydrogen diffusion in the near crack tip stress field, crack propagation in material containing dissolved hydrogen, and initiation of embedded microcracks promoted by dissolved hydrogen are reviewed. The limits of these quantitative models in materials screening applications and the demonstrated effect of hydrogen embrittlement on crack initiation are discussed in an extended summary of conclusions.

N79-32348/1 PC **A03**/MF **A01**
Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
Fatigue Testing of Titanium 6Al 4V.
N. Larsson. Jan 79, 27p FFA-TN-HU-1993
Contract FMV-F-K-82223-76-001-21-001

Fatigue tests on titanium 6Al 4V were performed using 90 specimens from 6464-2 and 6464-5 standard materials in order to verify preliminary Haig diagrams based on foreign investigations. Turned plain and notched specimens from bar stock were tested. Three different fatigue cases with R=-1, R=0, and sigma minimum-250 N/mm sq were applied. Static rupture tests were also performed. Results show no decisive difference between 6464-2 and 6464-5 materials in the static tests, while for the fatigue tests a comparatively large scatter of results is found for the 6464-5.

N79-32349/9 PC **A02**/MF **A01**
National Physical Lab., Teddington (England). Div. of Chemical Standards.
Torsion Tests on Steels Used in the Manufacture of High Pressure Vessels.
G. Oneill, and W. F. Wall. Mar 79, 17p NPL-CHEM-97

Design criteria for thick-walled cylinders in a 45 kilobar gaseous environment apparatus were based on the shear properties of H-13 steel. The data required was obtained from torsion tests on specimens of tempered H-13 bar stock followed by final tests on samples from the actual cylinder forgings. It was felt that shear data on some other steels commonly used for high pressure vessel construction would be of value to design engineers and the results for EN24, EN25, 3.5 percent NCMV, and three maraging steels, in addition to the data on H-13 are presented. The test apparatus is briefly described and the data analysis, which is supported by stress-strain curves for the various materials examined, is discussed.

N79-32351/5 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Heat Treatment Studies of Aluminum Alloy Type 7050 Forgings. Corroded-Specimen Fatigue Tests and SSC Propagation Tests.
L. Schra, and H. P. Vanleeuwen. 15 Jan 79, 43p NLR-TR-77124-U
Contract NIVR-1743

The influence of previous corrosion on fatigue life was investigated. It was found that a slight corrosive attack could drastically reduce fatigue life. The damaging effect of corrosion was greater for the alloy AA 7050 than for AZ 74.61. It was established that fatigue cracks initiated from various corrosion pits in these materials. A second series of stress corrosion crack propagation tests on AA7050 was performed. Quenching in boiling water was found to lead to high crack growth rates and a low threshold stress intensity value K sub ISCC in spite of the low yield stress obtained. Other heat treatment led to a monotonic increase in K sub ISCC with decreasing strength.

N79-32593/2 PC **A06**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Statik und Dynamik der Luft- und Raumfahrtkonstruktionen.
Einfluss der Blechdicke Auf den Rissfortschritt (Effect of Sheet Metal Thickness on Crack Propagation).
J. H. Argyris, W. Aicher, H. J. Ertelt, F. Karl, and G. Kierner. 1978, 114p ISD-240
Contract DFG-AR-44/34
Language in German.

Relations between fabrication procedures, stresses, and crack propagation were investigated in order to provide manufacturers with the information necessary to optimize series light metal constructions. Duralumin samples with thicknesses ranging from 0.6 to 8mm were studied. A special system was developed for automatically measuring crack lengths. The samples were subjected to both static and dynamic stresses. Variations in the critical stress intensity factor Kc were measured. A finite element simulation method was used to study an infinitely wide sample. Some correlation between theory and experiment exists although crack propagation behavior is very dependent on the sample's history (lamination, annealing). More experiments are needed to obtain conclusive results.

N79-32595/7 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Fracture Mechanics and Ambient Temperature Sustained Load Fracture.
R. J. H. Wanhill, and H. P. Vanleeuwen. 16 Mar 78, 29p NLR-MP-78008-U
Conf-Presented at Intern Symp. On Fracture Mech., Washington, D. C., Sep. 1978.

A generalized discussion of the phenomenological dependance of ambient temperature sustained load fracture on fracture mechanics parameters is presented. The practical interpretation and application of this analysis technique during structural materials selection is reviewed for stress corrosion cracking as well as for delayed failure in steel following galvanic plating, crack growth in gaseous hydrogen, sustained load cracking in titanium alloys, and for liquid metal embrittlement. Experimental problems encountered using this screening analysis, such as incubation time and rising load tests, pre-crack morphology, crack morphology, curved crack fronts, side grooves, and crack growth rate measurements are then considered. An in depth review of the mechanisms and theory of sustained load fracture is also given.

N79-32600/5 PC **A02**/MF **A01**
Royal Aircraft Establishment, Farnborough (England).
The Axial Loading Corrosion Fatigue Properties of 25MM Thick High and Low Strength X166 Plate (Dtd 5120 and Dtd 5130).
N. J. F. Gunn, and J. T. Ballett. Sep 78, 20p RAE-TR-78114, BR65880
Subm-Sponsored by Min. Of Defense.

Axial loading fatigue tests were made at R = 0.1 in laboratory air and in a 3.5 NaCl fog using holed transverse sheet type test pieces (K = 2.52) cut from the mid-position of 25 mm thick, high and low strength X166 plates. The test program was undertaken to determine the effect of a salt-fog environment on the fatigue properties of the two alloys. At 2 x 10 to the 7 power cycles the fatigue strength of the high strength X166 plate (DTD 5120) was reduced by 60% (from 162 MPa to 58 MPa) while that of the low strength X166 plate (DTD 5130) was reduced by approximately 40% (from 132.5 MPa to 77.5 MPa).

N79-33306/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Some Tem Observations of Al2O3 Scales Formed on Nicral Alloys.
J. Smialek, and R. Gibala. 1979, 34p NASA-TM-79259, E-171
Conf-Presented at Gordon Conf. On Corrosion, New London, N. H., 23-27 Jul. 1979.

The microstructural development of Al2O3 scales on NiCrAl alloys has been examined by transmission electron microscopy. Voids were observed within grains in scales formed on a pure NiCrAl alloy. Both voids and oxide grains grew measurably with oxidation time at 1100 C. The size and amount of porosity decreased towards the oxide-metal growth interface. The voids resulted from an excess number of oxygen vacancies near the oxide-metal interface. Short-circuit diffusion paths were discussed in reference to current growth stress models for oxide scales. Transient oxidation

of pure, Y-doped, and Zr-doped NiCrAl was also examined. Oriented alpha-(Al, Cr)2O3 and Ni(Al, Cr)2O4 scales often coexisted in layered structures on all three alloys. Close-packed oxygen planes and directions in the corundum and spinel layers were parallel. The close relationship between oxide layers provided a gradual transition from initial transient scales to steady state Al2O3 growth.

N79-33496/7 PC **A03**/MF **A01**
Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
Tongue-Shaped Crack Extension During Fatigue of High Strength Aluminum Alloys.
J. A. Vlasveld, and J. Schijve. Apr 79, 48p LR-279, ICAF-1098

Fracture surfaces of both service and laboratory fatigue fractures frequently show dark tongue-shaped marks. In fatigue tests on 7075-T6 specimens such tongues were produced by high peak loads. Measurements indicated that a tongue is not formed during a single burst of crack extension but is the result of a number of successive pop-ins requiring an increasing load. Therefore, tongue formation is a quasi-stable phenomenon. The tunnelling fracture in the center of plate thickness is accompanied by unfailed ligaments at the plate surfaces which reduce the stress intensity at the crack tip. The effect of different material conditions and loading direction on tongue forming was studied. A Dugdale-type model was developed to describe the growth of a tongue.

N79-33498/3 PC **A44**/MF **A01**
Technische Hogeschool, Delft (Netherlands).
Prediction Methods for Fatigue Crack Growth in Aircraft Material.
J. Schijve. Jun 79, 44p LR-282, ICAF-1100
Conf-Presented at the 12TH Natl. Symp. On Fracture Mech., 21-23 May, St. Louis; Sponsored by Astm.

A survey is given of relevant knowledge on fatigue crack growth and qualitative and quantitative understanding of predictions. Aspects of cycle-by-cycle predictions and characteristic K prediction methods are discussed. Prediction problems are covered including: (1) crack growth under flight-simulation loading with crack closure measurements; (2) predictions for flight-simulation loading based on a constant crack opening stress level; and (3) crack growth under pure random loading with different s sub rms-values, two irregularities, and two crest factors. Random load tests carried out to explore the usefulness of K sub rms are discussed.

ORNL/SUB-7556/1 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Assessment of the Corrosiveness of Cellulosic Insulating Materials.
R. Weil, and A. Graviano. Jun 79, 32p
Contract W-7405-ENG-26

A discussion of the information which is available about the corrosiveness of cellulose and other related properties is presented. A survey of the literature dealing with the corrosiveness of wood products other than cellulose and of the corrosiveness in other media by fire-retardant chemicals generally used with cellulosic insulation is included. The types of corrosion which could be caused by cellulosic insulation are briefly discussed. (ERA citation 04:052020)

11G. Miscellaneous Materials

AD-A075 507/4 PC **A03**/MF **A01**
Naval Surface Weapons Center Dahlgren Lab Va
Comparison of Ablative Materials in a Solid Rocket Motor Flow Field.
Final rept. Sep 78-Jan 79,
J. B. Henderson , L. P. Anderson , and G. R. Moore. Aug 79, 38p Rept no. NSWC/TR-79-218

Seven different ablative materials have been tested behind Thiokol TOMAHAWK rocket motors. The maximum erosion, erosion patterns, and the mass loss of the samples have been determined from these tests. In addition, time-dependent temperature profiles were measured in four of the test samples during firing. From these data, local ablation rates for the materials were determined. (Author)

11H. Oils, Lubricants, and Hydraulic Fluids

N79-32359/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Evaluation and Auger Analysis of a Zinc-Dialkyl-Dithiophosphate Antiwear Additive in Several Diester Lubricants.
W. A. Brainard, and J. Ferrante. Oct 79, 16p
NASA-TP-1544, E-9944

The wear of pure iron in sliding contact with hardened M-2 tool steel was measured for a series of synthetic diester fluids, both with and without a zinc dialkyl dithiophosphate (ZDP) antiwear additive, as test lubricants. Selected wear scars were analyzed by an Auger emission spectroscopy (AES) depth profiling technique in order to assess the surface film elemental composition. The ZDP was an effective antiwear additive for all the diesters except dibutyl oxalate and dibutyl sebacate. The high wear measured for the additive-containing oxalate was related to corrosion; the higher wear measured for the additive-containing sebacate was due to an oxygen interaction. The AES of dibutyl sebacate surfaces run in dry air and in dry nitrogen showed large differences only in the amount of oxygen present. The AES of worn surfaces where the additive was effective showed no zinc, only a little phosphorous, and large amounts of sulfur.

N79-32552/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Comparison of Predicted and Measured Elastohydrodynamic Film Thickness in a 20-Millimeter-Bore Ball Bearing.
J. J. Coy, R. S. R. Gorla, and D. P. Townsend. Oct 79, 29p NASA-TP-1542, AVRADCOM-TR-79-20

Elastohydrodynamic film thicknesses were measured for a 20-mm bore ball bearing using the capacitance technique. The bearing was thrust loaded to 90, 445, and 778 N (20, 100, and 175 lb). The corresponding maximum contact stress on the inner race was 1.28, 2.09, and 2.45 GPa (185 000, 303,000, and 356, 000 psi). Test speeds ranged from 400 to 15,000 rpm. Measurements were taken with four different lubricants: (1) synthetic paraffinic; (2) synthetic paraffinic with additives; (3) synthetic type II aircraft oil; and (4) synthetic cycloaliphatic hydrocarbon traction fluid. The test bearing was mist lubricated. Test temperatures were 27, 65, and 121 C (80, 150, and 250 F). The measured results for the various test parameters were compared to theoretical predictions from computer programs. Also the data were plotted on dimensionless coordinates and compared to several classical isothermal theories.

N79-33474/4 PC **A05**/MF **A01**
Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
Surface Temperatures and Glassy State Investigations in Tribology.
S. Bair, and W. O. Winer. Jul 79, 91p NASA-CR-162366
Grant NSG-3106

The limiting shear stress shear rheological model was applied to property measurements pursuant to the use of the constitutive equation and the application of the constitutive equation to elastrohydrodynamic (EHD) traction. Experimental techniques were developed to subject materials to isothermal compression which is similar to the history the materials were subjected to in EHD contacts. In addition, an apparatus was developed for measuring the shear stress-strain behavior of solid lubricating materials. Four commercially available materials were examined under pressure. They exhibit elastic and limiting shear stress behavior similar to that of liquid lubricants. The application of the limiting shear stress model to traction predictions was extended employing the primary materials properties measured in the laboratory. The shear rheological model was also applied to a Grubin-like EHD inlet analysis for predicting film thicknesses when employing the limiting shear stress model material behavior.

11I. Plastics

AD-A075 433/3 PC **A02**/MF **A01**
Office of Naval Research London (England)
How Plastics Fail – The Churchill Conference.
Conference rept.,
Willard D. Bascom. 3 Aug 79, 16p Rept no. ONRL-C-4-79

This report reviews the presentations and discussion at the 5th International Conference on Deformation, Yield and Fracture of Polymers held at the University of Cambridge on 2-5 April, 1979. The work presented at the Conference gives some insight into the state-of-the-art of research on how polymeric materials fail. No breakthroughs were revealed, but the tone of the Conference suggested a coming to grips with nonlinear processes. (Author)

AD-A075 534/8 PC **A02**/MF **A01**
Fluorochem Inc Azusa Calif
Preparation of Alpha, Omega-Diiodoperfluoro Alkanes.
Technical rept.,
Clifford D. Bedford , and Kurt Baum. 1 Oct 79, 12p Rept no. TR-1
Contract N00014-78-C-0520

Reaction conditions for the preparation of alpha, omega-diiodoperfluoro-alkanes from iodine and tetrafluoroethylene were studied. A laboratory method was developed for the preparation of multigram quantities of alpha, omega diiodoperfluoroalkanes. Similar results were observed using iodine and 1,2-diiodoperfluoroethane. A high conversion of 1,4-diiodoperfluorobutane to higher telomers was obtained. (Author)

PB80-100738 Not available NTIS
National Bureau of Standards, Washington, DC.
Lifetime Behavior of Polyethylene Bars in Uniaxial Extension in Various Chemical Environments.
Final rept.,
J. M. Crissmand, and L. J. Zapas. 1979, 11p
Pub. in ACS (American Chemical Society) Symposium, Series 95, Durability of Macromolecular Materials, Paper 20, p289-299 1979.

The uniaxial creep behavior of linear and branched polyethylene is examined in the presence of various environments. It is demonstrated that it is possible to use either a solvent or surface active type of stress-cracking agent as a means of accelerating fracture. In the case of a surface active stress-cracking agent a superposition principle has been applied in order to separate out one mechanism, that arising from bond rupture and crack formation. A proper description of this mechanism should be valuable as a means of predicting long time behavior under conditions where the applied load may be very small.

PB80-802143 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Foamed Plastics. Part 1. Polyurethane Foams (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Diane Cavagnaro. Dec 79, 296p
Supersedes NTIS/PS-78/1188, NTIS/PS-77/1061, NTIS/PS-76/0839, and NTIS/PS-75/634.

This report cites research concerning the fabrication, physical properties, chemical characteristics, and applications of polyurethane foams. Some of the applications include structural panels, floats, bouyant materials, thermal insulation, and packaging materials. (This updated bibliography contains 269 abstracts, 24 of which are new entries to the previous edition.)

PB80-802150 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Foamed Plastics. Part 2. Styrene, Silicone, Epoxy, and Other Polymeric Foams (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,

Diane Cavagnaro. Dec 79, 278p
Supersedes NTIS/PS-78/1189, NTIS/PS-77/1062, NTIS/PS-76/0840, and NTIS/PS-75/635.

The fabrication, mechanical and chemical properties, and applications of foamed plastics--except polyurethane--are covered in this bibliography. The major polymers studied are styrene, silicone, epoxy, cellulosic, ethylene, and imide resins. Applications include structural panels, electric and thermal insulation, and floats. (This updated bibliography contains 271 abstracts, 22 of which are new entries to the previous edition.)

12. MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

AD-A075 057/0 PC **A02**/MF **A01**
South Carolina Univ Columbia Dept of Mathematics Computer Science and Statistics
Interval Estimation after Sequential Testing for the Mean of the Exponential Distribution in the Large Sample Case.
Interim rept.,
W. J. Padgett , and L. J. Wei. Aug 79, 16p TR-45, AFOSR-TR-79-1039
Contract F49620-79-C-0140

Let m items be put on test at the outset, and suppose an item is not replaced upon failure. Assume an exponential failure distribution F sub Theta (t) = 1 - exp(-t/Theta). A time truncated sequential procedure for testing H0: Theta > or = Theta 0 versus H1: Theta < or = Theta 1 is developed. This procedure allows a quick rejection of HO when H1 is true, but provides an accurate interval estimate of Theta when HO is accepted after the test has been established. (Author)

AD-A075 058/8 PC **A02**/MF **A01**
Florida State Univ Tallahassee Dept of Statistics
Further Monotonicity Properties for Specialized Renewal Processes.
Interim rept.,
Mark Brown. Jul 79, 14p FSU-STATISTICS-M504, TR-79-B1-AFOSR, AFOSR-TR-79-1040
Contract F49620-79-C-0157

Define Z(t) to be the forward recurrence time at t for a renewal process with interarrival time distribution, F, which is assumed to be IMRL (increasing mean residual life). It is shown that E phi (z(t)) is increasing in t > or = 0 for all increasing convex phi. An example demonstrates that Z(t) is not necessarily stochastically increasing nor is the renewal function necessarily concave. Both of these properties are known to hold for F DFR (decreasing failure rate). (Author)

AD-A075 062/0 PC **A02**/MF **A01**
Texas Univ At Austin Dept of Electrical Engineering
The Study of Nonparametric Procedures for Discrimination and Clustering Problems.
Final rept. 1 Jul 77-30 Jul 79,
T. J. Wagner. 24 Sep 79, 10p AFOSR-TR-79-1064
Grant AFOSR-77-3385

No abstract available.

AD-A075 074/5 Not available NTIS
Missouri Univ-Columbia
Domains of Attraction in the Plane,
Walter Leighton. 24 Apr 78, 6p ARO-13610.1-M
Grant DAAG29-76-G-0206
Availability: Pub. in Bulletin of the Institute of Mathematics, Academia Sinica, v6 n2 pt2 p511-515 Dec 78 (No copies furnished by DTIC).

No abstract available.

AD-A075 076/0 Not available NTIS
Lowell Univ Ma Center for Atmospheric Research
Jost Solutions and Green's Functions for the Three-Dimensional Schroedinger Equation,
Harry E. Moses. 7 Jul 78, 6p ARO-14919.5-M
Grant DAAG29-78-G-0003
Availability: Pub. in Jnl. of Mathematical Physics, v20 n6 p1151-1156 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 077/8 Not available NTIS
Rutgers - the State Univ New Brunswick N J Dept of Mathematics
Bifurcation of Periodic Solutions,
Jane Cronin. 1979, 23p ARO-12981.3-M
Grant DAHC04-75-G-0148
Availability: Pub. in Jnl. of Mathematical Analysis and Applications, v68 n1 p130-151 Mar 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 092/7 PC **A02**/MF **A01**
Aerospace Medical Research Lab Wright-Patterson AFB Oh
On Covariance Propagation Using Matrix Continued Fractions,
D. W. Repperger. 5 Oct 78, 14p Rept no. AMRL-TR-78-100
Pub. in International Jnl. of Systems Science, v10 n8 p913-925 1979.

No abstract available.

AD-A075 156/0 PC **A02**/MF **A01**
Louisiana State Univ Baton Rouge Dept of Electrical Engineering
Partial Inverses for Parameter Sensitivity Reduction,
William A. Porter. 28 Apr 78, 14p AFOSR-TR-79-1045
Grant AFOSR-78-3500
Pub. in the International Jnl. of Control, v29 n6 p949-961 1979.

No abstract available.

AD-A075 295/6 Not available NTIS
Worcester Polytechnic Inst Mass
A Comparison Principle for Steady-State Diffusion Operators,
Jagdish Chandra , and Paul William Davis. 1977, 3p ARO-14245.1-M
Grant DAAG29-76-G-0237
Availability: Pub. in Nonlinear Systems and Applications: An International Conference, p68-71 1977 (No copies furnished by DTIC).

No abstract available.

AD-A075 301/2 Not available NTIS
Georgia Inst of Tech Atlanta School of Electrical Engineering
Algebraic Theory of Linear Time-Varying Systems,
Edward W. Kamen , and Khaled M. Hafez. 7 Jul 78, 11p ARO-13162.7-M
Grant DAAG29-77-G-0085
Availability: Pub. in SIAM Jnl. of Control and Optimizations, v17 n4 p500-510 Jul 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 304/6 Not available NTIS
Florida State Univ Tallahassee
Two Generalizations of Muirhead's Theorem,
F. Proschan , and J. Sethuraman. 2 Feb 76, 4p ARO-13888.19-MX
Grant DAAG29-76-G-0238
Availability: Pub. in Bulletin of the Calcutta Mathematical Society, v69 p341-344 1977 (No copies furnished by DTIC).

No abstract available.

AD-A075 324/4 PC **A03**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground Md Ballistics Research Lab
Special Function Solutions of the Diffusion Equation.
Final rept.,
John F. Polk. Jul 79, 35p ARBRL-TR-02182, AD-E430 307

In this report certain special functions are introduced and their properties discussed. In particular they are shown to be solutions of the diffusion(heat) equation satisfying special initial conditions. These functions are then used to obtain approximate solutions to initial-boundary value problems for the diffusion equation which are particularly accurate for small times. (Author)

AD-A075 376/4 PC **A02**/MF **A01**
Stanford Univ Calif Dept of Computer Science
Fast Algorithms for Solving Toeplitz System of Equations and Finding Rational Hermite Interpolants.
Technical rept.,
David Y. Y. Yun. Jul 79, 12p Rept no. STAN-CS-79-748
Contract N00014-76-C-0330, Grant NSF-MCS77-23738

We present a new algorithm that reduces the computation for solving a Toeplitz system to o(n log2 n) and automatically resolves all degenerate cases of the past. Our fundamental results show that all rational Hermite interpolants, including Pade approximants which is intimately related to this solution process, can be computed fast by an Euclidean algorithm. In this report we bring out all these relationship with mathematical justifications and mention important applications including decoding BCH codes. (Author)

AD-A075 393/9 PC **A04**/MF **A01**
Iowa Univ Iowa City Div of Educational Psychology
An Improved Model and Computer Program for Bayesian M-Group Regression.
Research rept. Oct 78-Mar 79,
Ivo W. Molenaar , and Charles Lewis. Mar 79, 63p Rept no. TR-79-5
Contract N00014-77-C-0428

This paper presents a modified model and computer algorithm for the estimation of regressions in m groups. The majcr features of the new approach are: (1) The use of parameters with constant values for slopes across groups whenever the prior or the data indicate that this is desirable, (2) the use of a residual variance constant across groups, (3) independent priors for regression parameters, (4) scales of the predictors at the grand mean rather than at the so-called 'Ideal scaling points', (5) transformation of all variables including the criterion to mean zero and variance one at the start of the calculations, (6) an improved search procedure for finding the mode of the posterior distribution. This new solution provides a greatly speeded-up algorithm which defines the posterior mode precisely. (Author)

AD-A075 487/9 PC **A05**/MF **A01**
Brown Univ Providence R I Lefschetz Center for Dynamical Systems
Two Papers on Jump Diffusion Approximations to Output Processes of Nonlinear Systems with Wide Band Inputs and Applications,
Harold J. Kushner. Jul 79, 77p Rept no. LCDS-TR-79-3
Grant AFOSR-76-3063, Contract N00014-76-C-0279
Sponsored in part by grant NSF-ENG73-03846A.

A convenient method for proving weak convergence of a sequence of non-Markovian processes x superscript epsilon (dot) to a jump-diffusion process is proved. Basically, it is shown that the limit solves the martingale problem of Strook and Varadhan. The proofs are relatively simple, and the conditions apparently weaker than required by other current methods (in particular, for limit theorems for a sequence of ordinary differential equations with random right hand sides). In order to illustrate the relative ease of applicability in many cases, a simpler proof of a known result on averaging is given. (Author)

AD-A075 553/8 PC **A03**/MF **A01**
Brown Univ Providence R I Lefschetz Center for Dynamical Systems
On the Existence of Simple Liapunov Functions for Linear Retarded Difference Differential Equations,
L. A. V. Carvalho , E. F. Infante , and J. A. Walker. Jul 79, 34p
Contract N00014-76-C-0278, Grant AFOSR-76-3092

Liapunov functions of simple form have been used for the study of stability properties of difference-differential equations. In this paper we provide necessary and sufficient conditions for the existence of such functions. (Author)

AD-A075 574/4 PC A02/MF A01
Stanford Univ Calif Dept of Statistics
Smoothness Priors and the Distributed Lag Estimator.
Technical rept.,
Hirotugu Akaike. Aug 79, 21p Rept no. TR-40
Contract N00014-75-C-0442

Shiller's distributed lag estimator based on a smoothness prior demonstrates the potential of the Bayesian approach to statistical model building. Nevertheless, when the number of significant lag coefficients is small the assumption of smoothness of the pattern of the lag coefficients may not be appropriate. In this paper, to cover such a situation, the smoothness is assumed for the behavior of the coefficients viewed in the frequency domain. This definition leads to a smoothness prior with a particularly simple form. Numerical result shows that the estimator based on this smoothness prior produces good estimates of the lag coefficients where Shiller's prior produces highly biased estimates. It is also observed that the new estimator produces reasonable results even when the Shiller's prior is more appropriate. The danger of introducing a bias by assuming a Bayesian model is stressed in the discussion. (Author)

AD-A075 578/5 PC A06/MF A01
Stanford Univ Ca Dept of Operations Research
Properties of Isotonic Estimators of Mean Lifetime in a Simple Prototype Development Model.
Technical rept.,
Thomas P. McWilliams. 16 Aug 79, 113p Rept no. TR-194
Contract N00014-75-C-0561

Consideration of a simple prototype development/reliability growth model leads to observation of variables X1, X2, ..., Xk; where the Xi are independent and are assumed to have the same distribution type with individual means lambda sub i. The problem is to estimate the lambda sub i, which are assumed to be non-decreasing due to design improvements in the device under development. For many common distributions, estimation via the restricted maximum likelihood principle leads to estimates which are the isotonic regression of the Xi with appropriate weights. This paper finds the distribution of lambda cap sub k, the mle of lambda sub k, when the Xi are exponentially distributed. Lambda cap sub k is then compared with X-bar and Xk, two competing estimates of lambda sub k. Gamma, normal, and Weibull distributed Xi are also considered, and the usefulness of lambda cap sub k is seen to depend on the relative magnitude of the variances and means of the Xi. Results are also examined when the restricted mles are generated assuming the lambda sub i are a non-decreasing and concave function of i. (Author)

AD-A075 594/2 PC A02/MF A01
George Washington Univ Alexandria Va Human Resources Research Office
A Method for Computing the Kendall Tau Coefficient,
Harold F. Bright. 24 Nov 53, 9p

No abstract available.

ANL-79-69 PC A02/MF A01
Argonne National Lab., IL.
Nonlinear Ergodic Theory in Banach Spaces.
S. Reich. Jul 79, 20p
Contract W-31-109-ENG-38

The author proves the mean ergodic theorem for nonlinear nonexpansive mappings in Banach spaces, extends it by a different argument, deduces several consequences, and points out open problems. (ERA citation 04:052397)

LA-7837-MS PC A02/MF A01
Los Alamos Scientific Lab., NM.
Curious Function of Otto Frisch.
C. J. Everett, and E. D. Cashwell. Jun 79, 11p
Contract W-7405-ENG-36

If (x/sub n/) is a countable set of points everywhere dense on (0,1), and (j/sub n/), a set of corresponding positive numbers with sigma sub 1 / sup infinity/ j/sub n/ = J < infinity, then a monotone nondecreasing function f(x) on (0,1), with f(0) = 0, f(1) = J, which is continuous on (0,1) except at each x/sub n/, where it is right continuous, but left discontinuous with jump j/sub n/, is necessarily a sum of step functions uniquely determined by the x/sub n/, j/sub n/. A curious function, explicitly defined by O. Frisch, is proved to be such a function, with jump j(p/q) = 1/(2/sup q/ - 1) at each (reduced) rational point p/q on (0,1), and continuous elsewhere. Moreover, it is rational valued iff x is rational, and has some remarkable number theoretic properties, stemming from its character as a sum of step functions. (ERA citation 04:052404)

N79-32161/8 PC A06/MF A01
Boeing Commercial Airplane Co., Seattle, Wash.
Time History Solution Program, L225 (TEV126). Volume 1: Engineering and Usage.
R. I. Kroll, A. Tornallyay, and R. E. Clemmons.
Sep 79, 105p NASA-CR-2859, D6-44468-V-1
Contract NAS1-13918

Volume 1 of a two volume document is presented. The usage of the convolution program L225 (TEV 126) is described. The program calculates the time response of a linear system by convoluting the impulsive response function with the time-dependent excitation function. The convolution is performed as a multiplication in the frequency domain. Fast Fourier transform techniques are used to transform the product back into the time domain to obtain response time histories. A brief description of the analysis used is presented.

N79-32907/4 PC A02/MF A01
Stanford Univ., Calif. Dept. of Computer Science.
Note on the Practical Significance of the Drazin Inverse.
J. H. Wilkinson. Apr 79, 21p NASA-CR-162307, STAN-CS-79-736
Grant NSG-1443

The solution of the differential system Bx = Ax + f where A and B are n x n matrices, and A - Lambda B is not a singular pencil, may be expressed in terms of the Drazin inverse. It is shown that there is a simple reduced form for the pencil A - Lambda B which is adequate for the determination of the general solution and that although the Drazin inverse could be determined efficiently from this reduced form it is inadvisable to do so.

N79-32928/0 PC A03/MF A01
National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer.
The AQ Algorithm for the Solution of a Sparse System of Linear Equations.
R. E. Borland. Mar 79, 45p NPL-DNACS-17/79

A method for the solution of a system of linear equations is described. It is based on an LQ factorization of the coefficient matrix A. Most of the lower triangular matrix L is not calculated directly; instead it is used in the form L = AQ transposed. For a suitably reordered sparse A, the orthogonal matrix Q has a concise representation. It is shown that this can be exploited to yield a stable, adaptable, and efficient method for the solution of sparse equations.

N79-32929/8 PC A02/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Computer Sciences.
A Class of Finite Element Methods for Advection-Diffusion Problems with Small Diffusion.
C. Johnson, and U. Naevert. 1978, 13p CTH-79.01-R

A class of stable finite element methods that are higher-order accurate for the dominating advection terms and first order accurate for the diffusion terms is proposed. In the simplest case, these methods correspond to finite difference methods with centered differencing for advection terms and down-wind differencing for diffusion terms.

N79-32930/6 PC A02/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
Integral Kernels and Approximation on Totally Real Submanifolds of Vector Space Exponent N.
B. Berndtsson. 1979, 10p CTH-MATH-1979-1

A proof is given of the theorem by Hormander-Wermer-Harvey-Wells which asserts that any function which is continuous on a compact subset of a totally real submanifold of vector space exponent n can be approximated there arbitrarily well in the supreme norm by functions that are holomorphic in a neighborhood of that compact. The proof is based on a formula which represents a probability from zero to infinity function phi in terms of alpha phi by means of an integral kernel.

N79-32931/4 PC A02/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
Analytic Approximation of Concave Functions.
B. Faxen. 1979, 7p CTH-MATH-1979-2

It is proved that an increasing, concave function f(x) on zero, infinity can be approximated from below by an increasing, concave function g such that g has an analytic extension to a sector absolute value of arg Z v, g' is bounded there, and the integral of 1 to infinity (f(x)-g(x)) dx/x squared infinity. If, an addition, f'(0) infinity, then it is possible to have the integral of zero to infinity (f(x)-g(x)) dx/x squared infinity.

N79-32932/2 PC A02/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
On Recurrence of a Random Walk in the Plane.
K. L. Chung, and T. Lindvall. 1979, 6p CTH-MATH-1979-4

In 1962, Chung and Ornstein gave a probabilistic proof of the fact that S sub N/N for P as it approaches zero in probability is sufficient for recurrence of a one dimensional random walk (S sub N) zero to infinity. A sufficient condition for recurrence in the plane is established, yielding that if S sub N/ square root of N is asymptotically normal, then there is recurrence.

N79-32934/8 PC A02/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
A New Proof of a Muentz-Type Theorem of Korevarr and Dixon.
M. Lundin. 1979, 10p CTH-MATH-1979-7

Korevaar and Dixon proved a result about the nonspanning of the exponentials e exponents (lambda Z sub N) on a curve gamma. Another proof of this result, using methods on analytic arcs, and for more general curves, but less general classes brace lambda sub N brace, is given.

N79-32936/3 PC A02/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
Approximation of E Exponent -X by Rational Functions with Concentrated Negative Poles.
J. E. Andersson. 1979, 11p CTH-MATH-1979-9

The degree of uniform approximation of e exponent -x on the positive real axis by rational functions is estimated. These functions are restricted to the form p(x) (x+ng sub N), exponent -N where p(x) is a polynomial of degree at most n and 2 sub N is a positive real number. Letting 2 sub N be the degree of approximation, the lower limit p sub N exponent 1/N and the upper limit p sub N exponent 1/N for an arbitrary sequence (q sub N) 1 to infinity is determined. In particular, it is shown that the lower limit p sub N exponent 1/N or = to the (square root of 2)-1 and that taking q sub N = 1/-square root of Z, N = 1, Z, ..., the limit p sub N exponent 1/N = the (square root of Z)-1 is obtained. This result yields a strengthening of an earlier result by Saff, Schoenhge, and Varga.

N79-32937/1 PC A02/MF A01
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
On Coupling of Continuous Time Renewal Processes.
T. Lindvall. 1979, 14p CTH-MATH-1979-11

How the coupling device may be used in the study of the asymptotic behavior of renewal processes in continuous time is shown. It is assumed that the recurrence times have a nonsingular distribution. The key idea is to provide an estimate of the distance, in total variation norm, between the distributions of two translated renewal processes with different delay distributions. Well known results for

renewal measures come out as consequences of this estimate.

N79-32938/9 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
On Maximum Error and Boundary Conditions in Cubic Spline Interpolation at Equidistant Knots.
I. Melinder. 1979, 33p TRITA-NA-79-02

A technique for the accurate approximation in a maximum norm of a continuous function f by splines is presented. Interpolation by cubic splines at equidistant knots, the endpoints, and at the midpoints of the endintervals is suggested. A spline s bar sub 4 is denoted and it is shown that this choice gives almost best knots and nodes by the criterion of Gaffney and Powell. This spline also gives a magnitude of error which is less than a factor of 7 of the least possible maximal error for any cubic spline with these knots. In fact, numerical computations give a factor of 2.7. It is also shown that cubic spline interpolation at equidistant knots is almost one-sided. In this case sharp bounds are given for the first derivative of the error function, provided the exact values are known at the endpoints. The case when the nodes are placed between the knots is investigated. This is in general less accurate.

N79-32939/7 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
Some Properties of Linear Multistep and One-Leg Methods for Ordinary Differential Equations.
G. Dahlquist. 1979, 5p TRITA-NA-79-04
Conf-Presented at ACM-Signum/Illinois Univ. Meeting on Numerical Ordinary Differential Equations, Urbana-Champaign, Ill., 3-5 Apr. 1979.

The numerical integration of the initial value problem for the differential system dy/dt = f(y) with y an element of a vector space exponent is presented. For the constant stepsize case a one-leg method is written. This is the one-leg twin of the linear multistep method. A one-leg method for the variable stepsize case is also given. Consistency conditions for these methods are discussed. Linear identity for arbitrary stepsize sequences and nonlinear equivalence for geometric stepsize sequences are shown. An exact solution of the differential system is proposed and the local error of the one-leg method discussed. In consideration of the application of the method, stability and contractivity are examined. The geometric idea behind the method is demonstrated in a plane with cartesian coordinates where a one-parameter family of straight lines is defined, the envelope of which is derived. It is shown that this envelope is exactly the parabolic boundary of the domain.

N79-32940/5 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
Generalized Disks of Contractivity for Explicit and Implicit Runge-Kutta Methods.
G. Dahlquist, and R. Jeltsch. 1979, 23p NASA-CR-162125, TRITA-NA-79-06
Contracts NCA2-OR/45-712, SNSF-82.524.077

The A-contractivity of Runge-Kutta methods with respect to an inner product norm was investigated thoroughly by Butcher and Burrage (who used the term B-stability). Their theory is extended to contractivity in a region bounded by a circle through the origin. The largest possible circle is calculated for many known explicit Runge-Kutta methods. As a rule it is considerably smaller than the stability region, and in several cases it degenerates to a point. It is shown that an explicit Runge-Kutta method cannot be contractive in any circle of this class if it is more than fourth order accurate.

N79-32941/3 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
Some Stability Properties of Linear Multistep Compound Discretizations of Partitioned Differential Systems.
G. Soederlind. 1979, 27p TRITA-NA-79-10

A linear multistep compound (LMC) method is obtained when different members of a differential system are integrated by different linear multistep methods, using the same stepsize for the whole system. The stability and contractivity properties of such methods are investigated, assuming that the system satisfies a monotonicity condition with respect to an inner product related to the partitioning of the system. Contractivity is derived for generalized disks contained in the stability regions of the linear multistep methods forming the LMC method. It is shown that, if weakly stable linear multistep methods are excluded, an LMC method is stable for a wide class of problems. Moreover, a properly designed LMC method may be useful for stiff systems with special structure.

N79-32957/9 PC **A02**/MF **A01**
Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
A Stagewise Directional Test Based on T Statistics.
S. Holm. 1979, 12p CTH-MATH-1979-3

It is shown that in regression analysis with orthogonal design, stagewise multiple tests (or closed multiple tests) of hypotheses concerning different parameters can be completed with directional statements for rejected hypotheses without increasing the probability of false statements.

N79-33923/0 PC **A10**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Mathematical Methods of Physics. 5: Functions of Complex Variables Metodos Matematicos DA Fisica. 5: Funcoes de Variavel Complexa.
R. A. Medrano-b. May 79, 225p INPE-1494-RPE/038
Misc-Revised.
In Portugese; English Summary.

The theory and functions of a complex variable are studied and their use in problem solving in physics is discussed. The concept of single value and multivaluedness of the functions is introduced by the concept of complex planes. Analytic functions and their properties, regular functions, Cauchy's theorem indefinite integral, and Cauchy's integral are studied. An analysis on complete series, tests of convergence, Taylor series, analytic continuation, and Laurent series is presented. The evaluation of real integrals by the use of the residue theorem is provided and a study is made of the gamma, beta, step, and other tabulated integral functions.

N79-33924/8 PC **A03**/MF **A01**
Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
The CLASSY Clustering Algorithm: Description, Evaluation, and Comparison with the Iterative Self-Organizing Clustering System (ISOCLS).
R. K. Lennington, and H. Malek. Mar 78, 37p
NASA-CR-160344, LEC-11289
Contract NAS9-15200

A clustering method, CLASSY, was developed, which alternates maximum likelihood iteration with a procedure for splitting, combining, and eliminating the resulting statistics. The method maximizes the fit of a mixture of normal distributions to the observed first through fourth central moments of the data and produces an estimate of the proportions, means, and covariances in this mixture. The mathematical model which is the basic for CLASSY and the actual operation of the algorithm is described. Data comparing the performances of CLASSY and ISOCLS on simulated and actual LACIE data are presented.

N79-33925/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Geophysical Approaches to Inverse Problems: A Methodological Comparison. Part 1: A Posteriori Approach.
T. I. Seidman, and M. J. Munteanu. Jun 79, 23p
NASA-TM-80301
Subm-Submitted for Publication.

The relationships of a variety of general computational methods (and variances) for treating illposed problems such as geophysical inverse problems are considered. Differences in approach and interpretation based on varying assumptions as to, e.g., the nature of measurement uncertainties are discussed along with the factors to be considered in selecting an approach. The reliability of the results of such computation is addressed.

N79-33949/5 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Effects of Linear Trend and Mean Value on Maximum Entropy Spectral Analysis.
R. P. Kane, and N. B. Trivedi. Sep 79, 20p INPE-1568-RPE/069
Misc-Revised.

Using artificial samples, it is shown that, even for the maximum entropy method (MEM) of spectral analysis of time series, a presence of a linear trend gives distortions in the low frequency (high periodicity) region and hence, it is advisable that linear trends be eliminated before subjecting a sample to MEM spectral analysis. Very large mean values reduce the sharpness of the peaks; but a sample expressed as deviations from mean does not necessarily give the best resolution. A mean of the same order of magnitude as the amplitude of the simusoids involved seems to provide better accuracy. Examples of some physical parameters for which results of spectral analysis by MEM are reported in recent literature, are discussed.

ORNL/CSD/TM-64 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Lecture Notes on Ordinary Differential Equations Software, User's Guides for ODE, RKF45, GEAR, and EPISODE.
J. A. Wenzel, and R. E. Funderlic. Aug 79, 89p
Contract W-7405-ENG-26

Four software packages for the numerical solution of initial-value problems for systems of ordinary differential equations are demonstrated with sample problems and solutions. These packages are contained in the Core Library of Numerical Software of the Computer Sciences Division, ORNL. 37 figures. (ERA citation 04:052405)

12B. Operations Research

AD-A075 059/6 PC **A02**/MF **A01**
University of Southern California Los Angeles Dept of Electrical Engineering
Estimation and Identification for Modeling Dynamic Systems.
Interim rept. 1 Mar 78-28 Feb 79,
Jerry M. Mendel. Sep 79, 7p AFOSR-TR-79-1043
Contract AFOSR-75-2797

Systems are modeled in order to understand and explain them better and as a prelude to action. Aircraft dynamics, for example, may be identified so that better designs can be made, or so that adaptive control actions can be taken. Our attention in this continuing study has been directed at aspects of estimation and identification that are connected with system understanding. This study has been aimed at state estimation and parameter identification for a new class of models, causal functional equations, which describe wave propagation in layered media systems. These models are applicable to diverse areas, such a reflection seismology, transmission lines, speech processing, optical thin coatings and EM problems. (Author)

AD-A075 165/1 PC **A03**/MF **A01**
Harvard Univ Boston Ma Graduate School of Business Administration
Multivalent Preference Structures.
Technical rept.,
PETER H. Farquhar. May 79, 28p Rept no. HBS-79-42
Contract N00014-78-C-0638
Revision of report dated Aug 79.

This paper presents a valence approach for assessing multiattribute utility functions. Unlike the decomposition approach which uses independence axioms on whole attributes to obtain utility representations, the valence approach partitions the elements of each attribute into classes on the basis of equivalent conditional preference orders. These partitions generate multivalent utility independence axioms that lead to additive-multiplicative and quasi-additive representation theorems for multiattribute utility functions defined over prod-

uct sets of equivalence classes. Preference interdependencies are thereby reflected in these classes, so attribute interactions are readily interpreted and the functional forms of the representations are kept simple. (Author)

AD-A075 169/3 PC **A03**/MF **A01**
Harvard Univ Boston Ma Graduate School of Business Administration
Advances in Multiattribute Utility Theory.
Technical rept.,
Peter H. Farquhar. Jul 79, 26p Rept no. HBS-79-56
Contract N00014-78-C-0638

Several advances in multiattribute expected utility theory have emerged recently. Much of the existing theory deals with independence axioms on whole attributes and the corresponding utility decompositions. This paper reviews three alternate approaches for obtaining representations of multiattribute utility functions: (1) multivalent preference analysis, (2) approximation methods, and (3) spanning analysis. Unlike some utility decomposition, these approaches require the assessment of only single-attribute functions which makes implementation relatively simple. Only multivalent preference analysis and spanning analysis, however, provide axioms that can be empirically tested to justify a particular utility representation. (Author)

AD-A075 171/9 PC **A02**/MF **A01**
Stanford Univ Calif Dept of Computer Science
Khachian's Algorithm for Linear Programming.
Technical rept.,
Peter Gacs , and Laszlo Lovasz. Jul 79, 15p
Rept no. STAN-CS-79-750
Contract N00014-76-C-0330, Grant NSF-MCS-77-23738

L G. Khachian's algorithm to check the solvability of a system of linear inequalities with integral coefficients is described. The running time of the algorithm is polynomial in the number of digits of the coefficients. It can be applied to solve linear programs in polynomial time. (Author)

AD-A075 173/5 PC **A02**/MF **A01**
Stanford Univ Ca Dept of Operations Research
Simulation Methods for Response Times in Networks of Queues.
Technical rept.,
Donald L. Iglehart , and Gerald S. Shedler. Aug 79, 24p Rept no. TR-49
Contract N00014-76-C-0578, Grant NSF-MCS75-23607
Sponsored in part by contract Grant NSF-MCS-79-09139.

Theoretically sound and computationally efficient estimation methods for 'passage times' in certain closed networks of queues is described. Informally, a passage time is the time for a job to traverse a portion of the network. Such quantities are important in computer and communication system models where they represent job response times, and in this context, quantities other than mean values are of interest. From a single simulation run, the methods described here provide both point estimates and confidence intervals for general characteristics of response times. (Author)

AD-A075 174/3 PC **A03**/MF **A01**
Stanford Univ Ca Dept of Operations Research
Regenerative Simulation of Response Times in Networks of Queues: Statistical Efficiency.
Technical rept.,
Donald L. Iglehart , and Gerald S. Shedler. Sep 79, 47p Rept no. TR-51
Contract N00014-76-C-0578, Grant NSF-MCS75-23607

In this report the calculation of variance constants entering into central limit theorems used to obtain confidence intervals from passage time simulations is considered. Using results of Hordijk, Iglehart, and Schassberger for the calculation of moments in discrete time and continuous time Markov chains, we calculate variance constants pertinent to mean passage times. This is done first for the 'marked job method' for passsage time simulation which is based on the tracking of a distinguished job, and then for the 'decomposition method' in which observed passage times for all of the jobs enter into the construction of point and interval estimates. The results of this paper provide a means of comparing the statistical efficiency of the two estimation methods.

AD-A075 196/6 PC **A11**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Technical Problems of Operations Research,
Yu. V. Chuyev , and G. P. Spekhova. 22 Jan 79, 244p Rept no. FTD-ID(RS)T-1986-78
Edited trans. of mono. Tekhnicheskiye Zadachi Issledovaniya Operatsiy, Moscow, 1971 1-242.

No abstract available.

AD-A075 219/6 PC **A03**/MF **A01**
Harvard Univ Boston Ma Graduate School of Business Administration
Equivalences and Continuity in Multivalent Preference Structures. Revision.
Technical rept.,
Peter H. Farquhar , and Peter C. Fishburn. May 79, 35p Rept no. HBS-79-47-REV
Contract N00014-78-C-0638
Revision of report dated Dec 78. Prepared in cooperation with Bell Telephone Labs., Inc. Murray Hill, NJ.

In eliciting multiattribute utility functions, the valence approach partitions the elements of each attribute into equivalence classes on the basis of conditional preferences. This report establishes equivalence relations for multivalent forms of additive independence, utility independence, and fractional independence, which lead to several new utility representation theorems. When the utility function is continuous, however, some simple partitions are impossible in multivalent preference structures. These results should simplify testing and assessment procedures when attributes are interdependent. (Author)

AD-A075 225/3 PC **A03**/MF **A01**
Center for Naval Analyses Alexandria Va Operations Evaluation Group
The d-Choice Secretary Problem.
Professional paper,
Kenneth S. Glasser , Richard Holzsager , and Austin Barron. Jun 79, 39p Rept no. CNA-PP-253

In the classical Secretary Problem, the player tries to choose the best object of a sequentially ordered set of size N. The value of each object is given by its rank only. At any stage, the player knows the rank of the current object relative to those already seen. Once rejected, an object cannot be chosen later. In this paper, a generalized Secretary Problem is discussed. The player is given d choices to choose all of the d best objects. The optimal procedure is found by converting the d choice Secretary Problem into a 'walk' in a two-dimensional grid. A simple approximation to the optimal strategy rule is also presented. (Author)

AD-A075 298/0 Not available NTIS
California Univ Berkeley Electronics Research Lab
A Second-Order Method for Unconstrained Optimization,
H. Mukai , and E. Polak. 1978, 13p ARO-11260.7-M
Contract DAAG29-73-C-0025, Grant NSF-AEN73-07732
Sponsored in part by Grant NSF-GK-37672.
Availability: Pub. in Jnl. of Optimization Theory and Applications, v26 n4 p501-513 Dec 78 (No copies furnished by DTIC).

No abstract available.

AD-A075 491/1 PC **A08**/MF **A01**
Stanford Univ Calif Dept of Engineering-Economic Systems
Optimal Information Acquisition for Randomly Occurring Decisions.
Research rept.,
Alimohammad Sharifnia. Sep 79, 154p Rept no. EES-DA-79-1
Contract N00014-79-C-0036

This research investigates the information acquisition policies for randomly occurring decisions. A randomly occurring decision is a decision that must be made upon the occurrence of a precipitating event that occurs randomly with time. Due to the urgency often associated with this type of decision, it is difficult to obtain fresh information at the time of the decision. Therefore, the available information will be limited to the unfresh (old) information from the past. Since the information becomes outdated and obsolete in time, regular updating of the information is often desirable in order to be prepared for the decision. The process of information outdating (perishing) and its relationship with the characteristics of the dynamic environment, the decision for which the information is used, and the type of information (perfect or imperfect) are investigated. The case of a one-time decision, namely when the decision happens only once, is studied initially. The results are then extended to the case where the decision may be repeated in time.

AD-A075 492/9 PC **A03**/MF **A01**
Center for Naval Analyses Alexandria Va
The Wandering Search,
James L. Bagby. Jul 79, 37p Rept no. CRC-377
Contract N00014-76-C-0001

The aggressive search for a target believed to be remaining within a specified region is analytically modeled. The probability of detection is expressed, both for the random search path and for any deliberate, non-overlapping path. The results are valid for any distribution of target positions in the region, for any lateral range detection curve, and for any target presence probability, provided that the target is not actively observing and dodging the searcher's path. Both the mobile and the stationary targets are considered, and targets having stochastic region-departure times are also considered. Also detection expressions are closed-form and readily calculatable. Some points of strategy are made on selection of the search region and selection of the deliberate versus the random tactic. (Author)

AD-A075 549/6 PC **A06**/MF **A01**
Stanford Univ Ca Dept of Operations Research
Simulating Generalized Semi-Markov Processes.
Technical rept.,
Lawrence D. Fossett. Sep 79, 103p Rept no. TR-50
Contract N00014-76-C-0578, Grant NSF-MCS75-23607
Sponsored in part by Grant NSF-MCS79-09139.

One approach to modeling queueing networks and other complex stochastic systems which has received some attention in the literature is the generalized semi-Markov process (GSMP). This idea is an example of the supplementary variables approach to non-Markovian systems. This approach supplements the natural description of the system by variables which contain information about the past history of the system. In this way, a model of a non-Markovian system can be made Markovian. For GSMPs the supplementary variables are clocks which record the amount of time until the occurrence of various events which could influence the system. Our approach to this problem is to find closely related regenerative processes on which to base the central limit theorem for the process under study. New results in the theory of Markov chains on a general state space make it clear how these regenerative processes can be constructed.

AD-A075 575/1 PC **A02**/MF **A01**
Stanford Univ Ca Dept of Operations Research
A Bounding Technique for Integer Linear Programming with Binary Variables.
Technical rept.,
Frederick S. Hillier , and Nancy Eileen Jacqmin. Jun 79, 17p Rept no. TR-86
Contracts N00014-76-C-0418, NSF-MCS76-81259

We present a bounding technique for use in implicit enumeration algorithms for solving the integer linear programming problem with binary variables. The main assumptions used by this technique are the associated linear program, obtained by dropping the integrality constraints on the variables, possesses a unique optimal solution, this optimal solution is not binary, and a good feasible solution to the original problem is available. An alternative to the last assumption which is weaker is also presented. We show that joint bounds can be ob-

tained on the values of a subset of the variables. In addition we given an efficient method to implement this bounding technique. Finally, a class of problems particularly well-suited to this bounding procedure is specified. (Author)

AD-A075 576/9 PC **A04**/MF **A01**
Stanford Univ Ca Dept of Operations Research
Documentation of a Computer Program for Hillier's Heuristic Procedure in Integer Linear Programming.
Technical rept.,
Nancy E. Jacqmin. Jul 79, 58p Rept no. TR-88
Contract N00014-76-C-0418, Grant NSF-MCS76-81259

This report gives documentation for the computer code HEUR for finding good approximate solutions to integer linear programming problems using Hillier's heuristic procedure. A listing of the program with sample input and output is included. (Author)

AD-A075 577/7 PC **A02**/MF **A01**
Stanford Univ Ca Dept of Operations Research
On the Candidate Problem with a Random Number of Candidates.
Technical rept.,
C. Derman , G. J. Lieberman , and S. Ross. 10 Aug 79, 14p Rept no. TR-192
Contract N00014-75-C-0561
Prepared in cooperation with Columbia Univ., contract N00014-75-C-0620 and Grant NSF-MCS78-25146, California Univ., Contract N00014-77-C-0299 and AFOSR-77-3213.

A decision maker has a total of M candidates to interview sequentially. The decision maker must either accept or reject the candidate being interviewed after he has been ranked with respect to his predecessors. Once rejected a candidate cannot be reconsidered; once a candidate is accepted no further interviews are carried out. The objective is to select the candidate in such a way as to maximize the probability of choosing the best of all M candidates (assuming every ordering of interviews is equally likely).

N79-32887/8 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
On Numerical Analysis in Semi-Infinite Programming.
S. A. Gustafson. 1979, 16p TRITA-NA-79-07

The theoretical questions which arise from the computational treatment of semi-infinite programs are discussed. Fairly strong regularity assumptions are needed to insure satisfactory results from the computational schemes described. The concept of a dual pair of semi-infinite programs is introduced. The optimal solution of one of the programs is represented by an ordered N-tuple. For the other program the situation is more complex since one parameter may be arbitrarily large. A theorem is proved which shows that a semi-infinite program can be replaced by a linear program. This is the rationale behind the methods based on discretization where a semi-infinite program is approximated by a linear program. Discrete approximations of semi-infinite programs are also treated as are iterative schemes. Actual calculations prove effectiveness of these methods.

N79-32926/4 PC **A02**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Scientific Services.
On the Use of Spline Functions and Collocation in a Trajectory Optimization Algorithm Based on Mathematical Programming.
J. J. Renes. 9 Feb 78, 23p NLR-TR-78016-U

Spline approximations, applied to state and control functions independently, and collocation of the differential equations of motion yields a mathematical programming problem for the unknown spline coefficients. The optimal choice of spline knots and collocation points for such an approach and the calculation of the gradients used in a mathematical programming solver are described. The application of this analysis technique to flight path optimization is emphasized.

N79-33927/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
Comparative Analysis of Various Approaches to Evaluating the Parameters of Multidimensional Models.
L. S. Guran. Oct 79, 15p NASA-TM-75922
Contract NASW-3198
Tran-Transl. Into English from Academy of Sciences USSR, Institute of Space Research, Report PR-350 (Moscow) 1977 p 1-14. Subm-Transl. By Scientific Translation Service, Santa Barbara, Calif.

The problem of evaluating parameters of a multidimensional model according to measurement results is examined. The conditions on which the problem solution depends are itemized.

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. Air Conditioning, Heating, Lighting, and Ventilating

AD-A075 094/3 PC **A06**/MF **A01**
Johns-Manville Sales Corp Denver Co Research and Development Center
Techniques for Control of Air Infiltration in Buildings.
Final rept. 1 Sep 78-15 Apr 79,
Philip B. Shepherd , and Judith E. Gerharter. 30 Apr 79, 118p USAFESA-TSD-2070
Contract DAAK70-78-D-0002

Materials and systems for reducing or eliminating air infiltration through almost all identified leakage sources have been found. Most of these materials are inexpensive, effective, and relatively easy to install or apply. These materials are generally designed to seal or close up small cracks or large openings in residential buildings. They encompass a very broad range of different methods such as caulking, adhesive/glass mat, weatherstripping, vent dampers, and many more. Those items having suitable effectiveness have been incorporated into a recommended procedure for treating existing and new construction. This procedure relies on the use of a special fan assembly and test procedures for locating air leaks in existing buildings and for measuring induced air infiltration in all buildings. The effectiveness of the different materials and systems is quite variable. Cost effectiveness has not been reliably measured; however, existing evidence strongly points to many air infiltration reduction materials as being highly cost effective with the exception of storm doors and, in some instances, storm windows. (Author)

AD-A075 140/4 PC **A02**/MF **A01**
Army Facilities Engineering Support Agency Fort Belvoir Va Technology Support Div
Ceiling Fans for Energy Conservation.
Final rept.,
George T. Story. 16 May 79, 14p Rept no. USAFESA-TS-2069

Considerations for the use of ceiling fans to conserve energy are given. A sample calculation of energy savings is included. (Author)

AD-A075 607/2 PC **A05**/MF **A01**
Construction Engineering Research Lab (Army) Champaign Il
Shock Resistance of Air-Conditioning Units Test Report for Ellis and Watts Company, Cincinnati, Ohio.
Special rept.,
James B. Gambill , and Walter E. Fisher. Sep 79, 92p Rept no. CERL-SR-M-273

This report presents the results of seismic qualification tests performed on air-conditioner units manufactured by the Ellis and Watts Company, Cincinnati, Ohio, to evaluate the units' capability to meet Tennessee Valley Authority seismic design requirements. Two units were tested on the CERL Biaxial Shock Test Machine. Functional performance remained normal for all units during the test run. (Author)

BNL-50968 PC **A05**/MF **A01**
Brookhaven National Lab., Upton, NY.
Case Study of the Brownell Low Energy Requirement House.
R. F. Jones, R. F. Krajewski, and G. Dennehy. May 79, 79p
Contract EY-76-C-02-0016

An evaluation is made of the design and thermal performance of an innovative house built in 1977 in the Adirondacks area of New York State. The house has a very tight and well-insulated envelope, with the rigid insulation board applied to the outside of the frame. Passive solar gain through south-facing glass, along with internal free sources of heat, are shown to provide a substantial part of the building's heating requirements. Effective integral thermal storage, provided by the exposed interior structure, serves to keep interior temperature excursions within acceptable limits. Additional remote storage is provided in the form of a large thermal storage sand bed, with air ducts, located below the basement floor. Calculations and measured performance data show that the house's space heating needs are only about 40% of those of a similar size house built to HUD minimum property standards, and less than 25% of those of a typical inventory house in the Northeast United States. (ERA citation 04:051851)

DOE/CS-0084 PC **A03**/MF **A01**
Department of Energy, Washington, DC. Office of State and Local Programs.
Annual Report to the President and the Congress on the Weatherization Assistance Program for Calender Year 1978.
Apr 79, 28p

The Program of Weatherizaton Assistance for Low-Income Persons was established by the Energy Conservation and Production Act, as amended. The program was established in recognition of the fact that low-income dwellings are frequently inadequately insulated; that low-income persons particularly elderly and handicapped low-income persons, can least afford to make the modifications necessary to provide for adequate insulation; and that weatherization of such dwellings would lower utility expenses for low-income persons as well as conserve needed energy. Initial implementation took place in 1977 and the distribution of $27 million in grant awards to the states and 24 Native American tribal organizations. The program became fully operational in 1978 as an additional $64.066 million was distributed to the grantees. Reports for the quarter ending December 31, 1978, reveal that 95,714 homes were weatherized during the year. It is projected that at the conclusion of the currently authorized program (FY 1980), 1.1 million low-income homes will have been weatherized. This projection represents only 9% of the households eligible for assistance. (ERA citation 04:048827)

DOE/ET/1237-01/15 PC **A05**/MF **A01**
Pope, Evans and Robbins, Inc., New York.
Multicell Fluidized Bed Boiler Design Construction and Test Program. Quarterly Progress Status Report, January--March 1979.
Jul 79, 80p
Contract EX-76-C-C-01-1237

The objective of this program is to design, construct, and test a multicell fluidized-bed boiler as a pollution-free method of burning high-sulfur or highly corrosive coals without excessive maintenance problems. The fluidized-bed boiler will provide approximately 300,000 pounds of steam per hour. Steam pressure and temperature conditions were selected to meet requirements of the site at which the boiler was installed. (ERA citation 04:052089)

FE-2489-37 PC **A08**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Development of Combustion Data to Utilize Low-Btu Gases as Industrial Process Fuels. Project 61004 Annual Status Report, October 1, 1977--September 30, 1978.
R. T. Waibel, and E. S. Fleming. Feb 79, 154p
Contract EX-76-C-01-2489

Combustion data have been collected for natural gas and three low-Btu gases fired on eight different burners. Tests have been completed with the forward-flow baffle burner, kiln burner, nozzle-mix burner, high-forward-momentum burner, flat-flame

burner, high-excess-air burner, and premix tunnel burner. Tests are partially completed using the boiler burner. The low-Btu gases simulated for these tests are Koppers–Totzek oxygen, Wellman–Galusha air and Winkler air fuel gases. In each case the burners were mounted on a pilot-scale test furnace, and the firing density and water tube load were adjusted to simulate conditions for a typical burner application. The experimental results allow evaluation of the ease of retrofitting the burners to use the low-Btu gases and provide a comparison of burner and furnace performances with the various fuels. (ERA citation 04:051094)

N79-32521/3 PC **A03**/MF **A01**
Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section Construction Metallique.
Designing Tubular Heat Exchangers Using an Interactive Computer Program.
R. Beeckman. May 79, 38p CRIF-MT-131
Subm-Sponsored by Inst. Pour l'Encouragement de la Rech. Sci. Dans l'Ind. Et l'Agr. Conf-Presented at Seminar on Machine Mech., Ghent.

An interactive computer program is proposed for the thermal design of tubular heat exchangers with either turbulent or streamline fluid characteristics. Although oriented towards the conversational use of the computer, which is easily achieved with minisystems, the program was written in standard FORTRAN 4 and this is largely independant of the type of machine used. Three main conditions are cited, the satisfaction of which is necessary to establishing the thermal rating of tube-and-shell heat exchangers. These are the need to provide sufficient heat transfer to meet the heat load requirements, the need to meet the pressure drop limitations of the shellside and tubeside fluids, and the need to comply with standard geometrical criteria, either general to all exchangers, or particular to a given unit. The types of exchangers considered, the mean temperature difference concept for mixed and for unmixed fluid, the pressure drop and convection coefficient correlations used for turbulent and for streamline flow, are discussed and a detailed program layout is given.

N79-32732/6 PC **A13**/MF **A01**
MITEC G.m.b.H., Ottobrunn (Germany, F.R.).
The Use of the Heat Pumps to Raise Temperatures in an Economical and Ecological Way.
Final Report, Jul. 1977.
M. Huber, and F. Bukau. Dec 78, 295p BMFT-FB-T-78-35
Contract BMFT-03E-5211-A/ETS-0004-A

The use of heat pumps to transfer the cooling water from plant condensers to a hot water district heating system was investigated both from a thermodynamic and economic point of view. A model of the system was derived and evaluated in detail. The specific consumption of primary energy and the expected specific heat costs were determined, depending on different parameters. Results show that if certain marginal conditions are presumed, such district heating system may be equivalent to or even better than conventional hot water district heating performed on the basis of combined power-heat generation.

N79-33571/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Nasa Tech House: An Early Evaluation.
1977, 23p NASA-TM-80751

An architect-engineering firm, as well as university participants, performed system studies, evaluated construction methods, performed cost effectiveness studies, and prepared construction drawings which incorporated the selected technology features into a final design. A Technology Utilization House (Tech House) based on this design was constructed at the NASA Langley Research Center in Hampton, Virginia. The Tech House is instrumented so that the performance of the design features and energy systems can be evaluated during a planned family live-in period. As such, the house is both a demonstration unit and a research laboratory. The Tech House is to demonstrate the kind of single-family residence that will probably be available within the next five years.

ORO-5165-1 PC **A07**/MF **A01**
DSS Engineers, Inc., Fort Lauderdale, FL.
Development of Plastic Heat Exchangers for Ocean Thermal Energy Conversion. Final Report, August 1976–December 1978.
G. K. Hart, C. O. Lee, and S. R. Latour. Jan 79, 133p
Contract EY-76-C-05-5165

Materials and processes have been selected and design information obtained for plastic ocean thermal energy conversion (OTEC) heat exchangers as the result of a program comprising five types of laboratory experiments. Tests to evaluate the chemical resistance of seven commercially available thermoplastics to sea water and several possible working fluids were conducted with emphasis placed on compatibility with ammonia. Environmental rupture tests involving exposure of stressed specimens to sea water or liquid ammonia indicated that the high density polyethylene (HDPE) is the best suited candidate and produced an extrapolated 100,000 hour failure stress of 1060 psi for HDPE. Long term durability tests of extruded HDPE plate-tube panel confirmed that plastic heat transfer surface is mechanically reliable in an OTEC environment. Thermal conductivity measurements of acetylene black filled HDPE indicated that conductivity may be increased by 50% with a 35% by weight filler loading. The permeability coefficient measured for liquid ammonia through HDPE was higher than previous estimates. Test showed that the rate can be significantly reduced by sulfonation of HDPE. A review of biofouling mechanisms revealed that the permeable nature of the plastic heat exchanger surface may be used to control primary biofouling form formation by allowing incorporation of non-toxic organic repellents into the plastic. A preliminary design and fabrication development program suggests that construction of an ammonia condenser test unit is feasible using currently available materials and manufacturing techniques. (ERA citation 04:051293)

ORO-5552-4(V.3) PC **A15**/MF **A01**
Auburn Univ., AL. Dept. of Mechanical Engineering.
Improving the Efficiency, Safety, and Utility of Wood Burning Units. Quarterly Report No. WB-4.
D. F. Dyer, T. T. Maxwell, and G. Maples. 15 Sep 78, 345p
Contract EC-77-S-05-5552

The design and test results for 16 wood burning stoves are presented. (ERA citation 04:051853)

PB80-102015 PC **A04**/MF **A01**
Acurex Corp., Mountain View, CA. Energy and Environmental Div.
Refinery Heater Screening Study.
Rept. for 1978,
S. L. Ayraud, and R. J. Schreiber. Mar 79, 63p 78/300, EPA/450/3-79/007
Contract EPA-68-02-2611

This screening study provides a general background description of refinery heaters, an inventory of their application, and estimates of SOx, NOx, and HCx emissions.

PB80-102767 PC **A05**/MF **A01**
Bechtel National, Inc., San Francisco, CA.
Assessment of Three Technologies for the Treatment of Cooling Tower Blowdown.
Final rept. Sep 78-Jul 79,
E. H. Houle, A. N. Rogers, M. C. Weekes, S. C. May, and V. C. der Mast. Sep 79, 89p EPA/600/7-79/220
Contract EPA-68-02-2616

The report gives results of analyses of three methods for treating cooling tower blowdown: vapor compression evaporation (VCE), reverse osmosis (RO), and vertical tube foaming evaporation (VTFE). The two evaporative processes produce pure water (approximately 10 ppm dissolved solids). RO produces water of lower purity (about 500 ppm) but adequate for many uses in the power plant or for return to the cooling tower. VCE has been used successfully in commercial power plants; the evaporative processes have no plants in operation on cooling tower blowdown. Plant investment is strongly influenced by the cost of lined ponds required to evaporate the treatment plant blowdown and store the residual salts. Consequently, the RO plant investment is almost in the range of that of VTFE and VCE plants. In total capital plus operating costs, VTFE has a distinct advantage over RO and VCE because its source of energy is waste heat to which a zero value has been assigned. The VTFE economics is based on vertical tube evaporator experience (without adding surfactant). If field pilot tests substantiate previous laboratory results, the economics of the VTFE may prove to be even more favorable.

PB80-105851 PC **A03**/MF **A01**
South Dakota Univ., Vermillion. Human Factors Lab.
Information Content at Night of Roof-Mounted Emergency Vehicle Lights.
Final rept. 1 Jul 75-30 Aug 76,
Jan Berkhout. Oct 79, 41p DOT/RSPA/DPB-50/79/37
Contract DOT-OS-50121

A field experiment was performed in which eight different configuration and color combinations of commonly used rotating focused-beam emergency vehicle lights were quantitatively compared over several dimensions of information transfer relative to rate and direction of motion at night. Observers viewed the lights at a distance of 300 to 500 yards through the windshield of a vehicle parked in the driving lane of an unused road. The vehicle bearing the lights moved back and forth at various rates of speed, directly on the viewer's axis of vision, with little or no lateral movement. Differences were found between the various lights in terms of subject response distributions, apparent illusions of motion, signal to noise ratios within response patterns and error scores. Red lights were generally superior to blue, and monocolor lights were superior to combinations of red and blue in the same light. Twin lights were superior to single beacons, and models with a sequential mirror-generated flash pattern were superior to plain ones. Several of the lights created an illusion of motion when actually at rest. This was most severe for the side-to-side twin light using red lenses. A trade-off was noted between conspicuity and information transfer, in that the lights which were most conspicuous against a road environment background were not those with the best information transfer characteristics.

PB80-106610 PC **A03**/MF **A01**
New England Innovation Group, Providence, RI.
Energy Conservation Measures for the Charles E. Shea Senior High School, Pawtucket, Rhode Island.
Public service rept.
Jul 79, 36p NSF/RA-790192
Grant NSF-ISP77-20656
Sponsored in part by National Bureau of Standards, Washington, DC., Federal Lab. Consortium, and Army Cold Regions Research and Engineering Lab.

A thermographic audit of a Pawtucket, Rhode Island high school is reported. Conducted with the aid of an infrared camera system, this thermographic study located heat losses not evident to the naked eye. Heat losses were documented and the thermograms analyzed to obtain complete knowledge of the location of all heat losses from the building complex. Each thermogram showed one or more types of heat loss together with the specific section of the building where it occurred. Priorities were assigned to various retrofit processes and a thermographic inspection conducted after retrofitting to confirm its efficacy. The study comprised an analysis and recommendations of heat loss and heating system appraisals plus an analysis of roof moisture inspection. Numerous thermograms illustrate the report.

PB80-111560 CP **T03**
Department of Housing and Urban Development, Washington, DC. Div. of Energy, Building Technology and Standards.
HUD Residential Solar Viability Program (RSVP/2): Computer Tape.
Model-Simulation,
Arthur Reiger, and Frank Weinstein. Sep 79, mag tape HUD/DF-79/003
Source tape is in ASCII character set. Character set restricts preparation to 9 track one-half inch

tape only. Identify recording mode by specifying density only. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-111578, and PB80-111586.

This item includes the source code and all necessary data files for the HUD Residential Solar Viability Program (RSVP/2). The tape contains two complete copies of the program and data files, the first copy in ASCII, the second in EBCDIC. The model is an interactive computer program that permits analysis of a wide range of residential solar energy applications using active solar systems for actual conditions of location, housing type, market economics, and other economic or financial factors. Output is provided in a number of report formats oriented to different users. The program can be used to access the economics of both single and multi-family solar applications. The user is given flexibility in specifying either a small basic set of inputs or best-estimate default values for input items not known or readily available to the user. Available documentation includes a Users Manual and a Programmers Manual...Software Description: This program is written in the FORTRAN programming language for implementation on a UNIVAC 1108 computer using the EXEC 8 operating system. A minimum of 55 K words of core storage is needed to use the system.

PB80-111578 PC **A09**/MF **A01**
Booz-Allen and Hamilton, Inc., Bethesda, MD.
HUD Residential Solar Viability Program (RSVP/2): Users Manual.
Sep 79, 184p HUD/DF-79/003A
Contract HUD-H-2493
For system on magnetic tape, see PB80-111560. See also PB80-111586. Sponsored in part by Department of Energy, Washington, DC.

This manual describes the use of RSVP/2, a computer program developed as a resource tool for analyzing the economics and financing of residential solar energy systems. It is intended for use primarily by key housing industry decision makers such as builder/developers and financial institutions. RSVP/2 permits analysis of a range of residential solar energy applications for the actual conditions of location, housing type, market economics, and other factors of interest to individual users. Information is provided in a variety of formats and reports oriented to different users. The program can be used to assess the economics of both single and multi-family solar applications. The program allows the user to input a small basic set of data items and will supply average or best estimate values, called default values, for information not known or readily available.

PB80-111586 PC **A16**/MF **A01**
Booz-Allen and Hamilton, Inc., Bethesda, MD.
HUD Residential Solar Viability Program (RSVP/2): Programmers Manual.
Sep 79, 365p HUD/DF-79/003B
Contract HUD-H-2493
For system on magnetic tape, see PB80-111560. See also PB80-111578. Sponsored in part by Department of Energy, Washington, DC.

This document is a technical reference for programmers who may need to install or modify RSVP/2. It is intended as a supplement to the Users Manual. The Users Manual describes the model, gives detailed instructions for its use, and provides a complete description of the model from the perspective of the user. The Programmers Manual contains a description of the program architecture and data bases, as well as a summary of the programming conventions which were followed in coding the model. It contains the following information: Getting RSVP/2 running, Descriptions of each program unit in the code together with flow charts, a complete program listing, a description of the data base, a discussion of the program conventions and a summary of the equations used in the model.

PB80-801707 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Solar Space Heating and Air Conditioning. Volume 3. September, 1977-September, 1978 (Citations from the NTIS Data Base).
Rept. for Sep 77-Sep 78,
Audrey S. Hundemann. Dec 79, 99p
For the companion Published Searches of the Engineering Index Data Base, see NTIS/PS-77/0828, NTIS/PS-78/1016, and PB80-801723. See also Volume 1, 1964-1975, NTIS/PS-77/0826 and Volume 2, 1976-August, 1977, NTIS/PS-78/1014.

Design, technical feasibility, performance, and economic factors pertaining to solar heating and cooling of buildings are discussed. Commercial buildings, schools, and residential buildings are covered, with emphasis on the assessment of solar heating and cooling systems for residential buildings. Included are a few abstracts of reports on solar energy as a national energy resource; solar energy research program alternatives; and social, environmental, and institutional factors affecting the feasibility of using solar energy for heating and cooling buildings. (This updated bibliography contains 90 abstracts, none of which are new entries to the previous edition.)

PB80-801715 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Solar Space Heating and Air Conditioning. Volume 4. October, 1978-October, 1979 (Citations from the NTIS Data Base).
Rept. for Oct 78-Oct 79,
Audrey S. Hundemann. Dec 79, 235p
Supersedes NTIS/PS-78/1015, NTIS/PS-77/0827, NTIS/PS-76/0727, NTIS/PS-75/689, and NTIS/PS-75/345. For the companion Published Searches of the Engineering Index Data Base, see NTIS/PS-77/0828, NTIS/PS-78/1016, and PB80-801723. See also Volume 1, 1964-1975, NTIS/PS-77/0826 and Volume 2, 1976-August, 1977, NTIS/PS-78/1014, and Volume 3, September, 1977-September, 1978, PB80-801707.

Design, technical feasibility, performance, and economic factors pertaining to solar heating and cooling of buildings are discussed. Commercial buildings, schools, and residential buildings are covered, with emphasis on the assessment of solar heating and cooling systems for residential buildings. Included are a few abstracts of reports on solar energy as a national energy resource; solar energy research program alternatives; and social, environmental, and institutional factors affecting the feasibility of using solar energy for heating and cooling buildings. (This updated bibliography contains 226 abstracts, all of which are new entries to the previous edition.)

PB80-801723 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Solar Space Heating and Air Conditioning. Volume 3. September, 1977-October, 1979 (Citations from the Engineering Index Data Base).
Rept. for Sep 77-Oct 79,
Audrey S. Hundemann. Dec 79, 153p
Supersedes NTIS/PS-78/1017, NTIS/PS-77/0829, and NTIS/PS-76/0728. For the companion Published Searches of the NTIS Data Base, see NTIS/PS-77/0826, NTIS/PS-78/1014, PB80-801707 and PB80-801715. See also Volume 1, 1970-1975, NTIS/PS-77/0828 and Volume 2, 1976-August, 1977, NTIS/PS-78/1016.

Studies from worldwide literature on the use of solar energy to heat and cool buildings are discussed, with emphasis on the heating and cooling of residential buildings and schools. Design, technical feasibility, economics, and performance simulation studies are cited. Abstracts pertaining to solar assisted heat pump systems and assessment of solar heated Rankine cycle cooling are included. (This updated bibliography contains 146 abstracts, 49 of which are new entries to the previous edition.)

PB80-801731 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Passive Solar Space Heating and Cooling (Citations from the NTIS Data Base).
Rept. for 1964-Oct 79,
Audrey S. Hundemann. Dec 79, 66p
For the companion Published Search of the Engineering Index Data Base, see PB80-801749.

Design, technical feasibility, performance, and economic factors pertaining to passive solar heating and cooling of buildings are discussed. Abstracts cover trombe walls and air thermosiphon solar heating systems, comparative economics of passive and active systems, and performance simulation studies. (Contains 58 abstracts)

PB80-801749 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Passive Solar Space Heating and Cooling (Citations from the Engineering Index Data Base).
Rept. for 1970-Oct 79,
Audrey S. Hundemann. Dec 79, 50p
For the companion Published Search of the NTIS Data Base, see PB80-801731.

Studies from worldwide literature on the passive solar heating and cooling of buildings are discussed. Abstracts cover design and performance simulation studies of trombe walls and air thermosiphon solar heating systems. (Contains 45 abstracts)

TID-28819 PC **A06**/MF **A01**
AIA Research Corp., Washington, DC.
Phase One/Base Data for the Development of Energy Performance Standards for New Buildings. Final Report.
12 Jan 78, 110p
Contract EX-7-A-29-1020

The objective of this research was to establish a consistent reference, or baseline of current practice for the evaluation of alternative energy standards to be used in the design of new buildings. This was done by estimating the energy consumption of recent residential and nonresidential buildings from building design data. The energy performance of buildings is a function of their physical characteristics, intended use, and climatic conditions. In order to calculate the annual energy consumption of recently designed buildings, it was necessary to (1) classify the variation in building type and climate across the country, (2) define data requirements, identify a building sample, and collect data on building designs, and (3) employ consistent methods to calculate the energy performance from the sample buildings' designs. Buildings were divided into two major groups for the purposes of data collection and data analysis, due to differences in design and construction practices and data availability. Nonresidential building types included commercial and multifamily high rise residential construction. Residential building types included single family homes, low-rise multifamily housing and mobile homes. (ERA citation 04:048831)

UCRL-15035 PC **A02**/MF **A01**
Casting Consultants Co., Castro Valley, CA.
Project Vulcan Heater: Centerbody Casting.
11 Jun 79, 10p
Contract W-7405-ENG-48

Specifications for casting the centerbody housing of the vulcan heater are provided. CD-4MCu steel has been specified for the centerbody and the properties of the steel are given. (ERA citation 04:051905)

13B. Civil Engineering

AD-A075 111/5 PC **A05**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Ms Geotechnical Lab
Structural Evaluation of Open-Graded Bases for Highway Pavements.
Final rept. Jun 77-Sep 78,
Walter R. Barker , and Robert C. Gunkel. Aug 79, 87p Rept no. WES-GL-79-18
Also available as Rept. no. DOT-79-002-7740.

Gyratory shear tests and repeated load triaxial compression tests were conducted on five different base courses furnished by the New Jersey Department of Transportation (NJDOT). Two of the materials, one stabilized with asphalt and the other unstabilized, were open-graded aggregate bases designed to provide a high degree of porosity. The other three materials were conventional bases currently being used by the NJDOT. The conventional bases were a high-quality, asphalt-stabilized base material, a crushed rock, and a pit-run gravel. The laboratory tests indicated that for dynamic loads, such as would be the case for high-speed highway

traffic, the open-graded bases would perform better than or as well as the nonstabilized conventional bases but not as well as the high-quality stabilized base. For static loading, the nonstabilized bases were superior to the asphalt-stabilized bases. The minimum coverage requirement for the open-graded bases is estimated to be approximately 6 in. The data provided by gyratory testing proved to be useful in evaluating the base materials, and the recommendation is made to continue development of gyratory testing for evaluation of pavement materials. (Author)

AD-A075 112/3 PC **A04**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Ms Geotechnical Lab
Evaluation of Drilled and Grouted-in-Place Dowels for Load Transfer of Portland Cement Concrete, Tyndall Air Force Base, Florida.
Final rept.,
Robert W. Grau. Aug 79, 53p Rept no. WES-GL-79-11

This study utilizes the results of measured strains under static loadings and measured deflections under nondestructive vibratory loadings of the portland cement concrete at three instrumented test locations to determine the adequacy of dowels installed by the drill-and-grout method in longitudinal joints as load transfer devices. Two test procedures are used to evaluate the instrumented joints, and then the test results are compared. The computed load transfer of these joints determined from the strain measurements were compared with the results of the same type of testing performed in the 1950's on drilled and grouted-in-place doweled joints and with a theoretical analysis of this type of joint construction. Nondestructive test results performed on joints of different construction from the instrumented joints are also presented for comparison purposes. (Author)

AD-A075 159/4 PC **A08**/MF **A01**
Scs Engineers Long Beach Calif
Subpotable Water Reuse at Army Fixed Installations: A Systems Approach. Volume I.
Final rept. 1 Oct 78-30 Sep 79,
Curtis J. Schmidt , Ernest V. Clements , and LeAnne Hammer. Aug 79, 170p
Contract DAMD17-78-C-8080
See also Volume 2, AD-A075 233.

This report concerns the treatment and reuse of wastewater at fixed Army installations. The objective was to provide a tool that could be used by the Army in assessing the potential for water reuse at all their fixed facilities; in isolating those bases with the best reuse potential; and in evaluation conceptual reuse schemes at those bases. All major Army activities involving water and wastewater were researched and described. In addition, a three-tiered water reuse model was developed that leads the evaluates through three phases of evaluation culminating in the use of a sophisticated computer model. (Author)

AD-A075 231/1 PC **A04**/MF **A01**
Enviro Control Inc Rockville Md
Modifications to the Vulnerability Model: A Simulation System for Assessing Damage Resulting from Marine Spills.
Final rept.,
Chi K. Tsao , and Willard W. Perry. Mar 79, 63p
USCG-D-38-79
Contract DOT-CG-33377-A

This report describes several modification to the U.S. Coast Guard Vulnerability Model which have recently been incorporated. These modifications are in three areas: 1. Revisions of the plume and puff model for toxic damage assessment, to include remodeling of the plume model to reduce computer time and storage space, computing the dosage for the puff model by direct integration, and transferring dosage values computed in Phase I of the Vulnerability Model directly to Phase II. 2. Revision of thermal injury and the lethality criteria in Phase II based on recent applicable experimental thermal effects data. 3. Remodeling of the flash fire for puff and plume models to compute thermal radiation during both burning and cooling phases for experimentally determined burning rates and maximum surface temperatures. (Author)

AD-A075 233/7 MF **A01**
Scs Engineers Long Beach Calif
Subpotable Water Reuse at Army Fixed Installations: A Systems Approach. Volume II. User Manual.
Final rept. 1 Oct 78-30 Sep 79,
Curtis J. Schmidt , Ernest V. Clements , and LeAnne Hammer. Aug 79, 183p
Contract DAMD17-78-C-8080
See also Volume 1, AD-A075 159.
Availability: Document partially illegible.

This report concerns the treatment and reuse of wastewater at fixed Army installations. The objective was to provide a tool that could be used by the Army in assessing the potential for water reuse at all their fixed facilities; in isolating those bases with the best reuse potential; and in evaluation conceptual reuse schemes at those bases. All major Army activities involving water and wastewater were researched and described. In addition, a three-tiered water reuse model was developed that leads the evaluates through three phases of evaluation culminating in the use of a sophisticated computer model. (Author)

AD-A075 243/6 PC **A06**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Shipboard Sewage Treatment System for Great Lakes Vessels.
Research and development rept.,
Craig S. Alig , and Alexander E. Lardis. Sep 79, 112p Rept no. DTNSRDC-79/005

Two sewage treatment systems aboard Great Lakes iron ore carriers were evaluated: A Chlorinator-Macerator System aboard SS EDWARD B. GREENE, and a BIOGEST '25' System aboard SS WALTER A. STERLING. The systems had been installed in 1962 and 1960, respectively. The lack of trained shipboard operating personnel caused termination of the BIOGEST evaluation. The Chlorinator-Macerator evaluation revealed a need for a system with improved operational characteristics. The Chlorinator-Macerator System was modified to utilize ozonation followed by small additions of sodium hypochlorite solution to complete disinfection and provide a slight chlorine residual. It was designed to (1) minimize manpower operating requirements; (2) simplify maintenance, troubleshooting, and repair; (3) require little logistical support; and (4) interface with existing shipboard piping and electrical systems while complying with the U.S. Environmental Protection Agency's Type-II marine sanitation device Effluent Quality Standards. The new prototype Blackwater Treatment System was evaluated in 1975 and 1976. The system produced effluent within U.S. Environmental Proteciton Agency Standards for a Type-II marine sanitation device. Design drawings for a prototype treatment system for further development are included. (Author)

AD-A075 274/1 PC **A07**/MF **A01**
San Jose State Univ CA Cartrems Lab
Characteristics of Urban Terrain.
Final rept. Jul 78-Jun 79,
Richard Ellefsen, Thomas Kuhn, Gary Spring, and L. E. Wicks. Jun 79, 148p NSWC-TR-79-224
Contract N60921-78-R-A118
See also Rept. no. NSWC/DL-TR-3714, AD-B021 610.

Characteristics of Urban Terrain, expands upon findings displayed in a previous study (Urban Building Characteristics, Ellefsen, 1977) completed for the Naval Surface Weapons Center, Dahlgren, Virginia. Results reported here are far more detailed in every respect. For instance, exact figures are given for such building characteristics as thicknesses for exterior walls and interior partitions of varying types; the previous study provided data within ranges. Data reported earlier were subjected to intensive analysis and are presented here in expanded form, both graphic and tabular. Broad, new conceptual notions concerning the environmental setting for building were explored, measured, analyzed, and presented in variety of graphic ways. Findings are presented which have potentially very high value for consideration of conducting military operations in urban areas. (Author)

AD-A075 308/7 MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Western Branch Reservoir Dam (VA-12311), Lower James River Basin, City of Suffolk, Virginia (Formerly Nansemond County). Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 61p
Contract DACW65-78-D-0015
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of th edam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additonal indepth study when necessary.

AD-A075 309/5 MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. Lake Brittle Dam (VA-06122), Potomac River Basin, Fauquier County, Virginia. Phase I Inspection Report.
Final rept.,
James A. Walsh. Sep 79, 68p
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need forsuch studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 310/3 MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. Pohick Creek Number 7 (Inventory Number-05905), Potomac River Basin, Tributary of Pohick Creek, Fairfax County, Virginia. Phase I Inspection Report.
Final rept.,
James A. Walsh. Sep 79, 99p
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I in-

vestigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 311/1 MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. Upper Blackwater River Dam Number 4 (Inventory Number 06702), Tributary of the North Fork of the Blackwater River, Franklin County, Virginia. Phase I Inspection Report.
Final rept.
Aug 79, 82p
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 312/9 MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. Upper Blackwater River Dam Number 6 (Inventory Number 06701), Tributary of the North Fork of the Blackwater River, Franklin County, Virginia. Phase I Inspection Report.
Final rept.
Aug 79, 73p
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 313/7 MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. Falling Creek Dam (Inventory Number 01910), Roanoke River Basin, Falling Creek, Bedford County, Virginia. Phase I Inspection Report.
Final rept.
Sep 79, 47p
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluatons are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 314/5 MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Upper South Lake Dam (Inventory Number VA-05913), Potomac River Basin, Tributary to Snakeden Branch, Fairfax County, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 77p
Contract DACW65-78-D-0015
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 315/2 MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Pohick Creek Dam Site Number 4 (Inventory Number VA-05922), Potomac River Basin, Fairfax County, Virginia, Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 81p
Contract DACW65-78-D-0015
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 316/0 MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Lake Meade Dam (Inventory Number VA-80013), Lower James River Basin, City of Suffolk, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 62p
Contract DACW65-78-D-0015
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 317/8 MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Lake Cohoon Dam (Inventory Number VA-12301), Lower James River Basin, City of Suffolk, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 109p
Contract DACW65-78-D-0015
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 318/6 MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va

National Dam Safety Program. Lake Burnt Mills Dam (Inventory Number VA-12303), Lower James River Basin, City of Suffolk, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 100p
Contract DACW65-78-D-0015
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 319/4 MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Swift Creek Reservoir Dam (Inventory Number VA-04112), Middle James River Basin, Chesterfield County, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 104p
Contract DACW65-78-D-0015
Availability: Document partially illegible.

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 328/5 PC **A04**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Ms Hydraulics Lab
Savannah Harbor Investigation and Model Study; Volume IV. Reanalysis of Freshwater Control Plan. Numerical Model Study.
Final rep. Dec 72-Apr 74,
Carl J. Huval , Roger H. Multer , Paul K. Senter , and Marden B. Boyd. Sep 79, 62p Rept no. WES-HL-TR-2-580-VOL-4
See also Volume 3, Section 5, AD-724 931.

An extensive series of physical model investigations was conducted during the late 1950's and early 1960's to develop plans for reducing maintenance dredging costs for Savannah Harbor. The plan developed involved dredging a sediment basin at the lower end of Back River, construction of a tide gate in Back River, dredging a connecting canal between Back River and Middle River, and channel improvements in the upstream portion of Back River. As the plan was being implemented, questions arose that required a reanalysis of the impact of the plan on salinities in Little Back River. Numerical models, flow and salinity, were developed and applied to the channel network above Fort Jackson to estimate salinity levels at the location of the freshwater intake for the wildlife refuge adjacent to Little Back River. Computations for preproject conditions and with the plan fully implemented indicted relatively small salinity increases at the location of the intake. The computations also indicated that should these small increases prove detrimental, further improvements in the back channels could increase the freshwater inflow to the back channels. Appendices A and B of the report discuss the hydrodynamic and salinity models, respectively, used in the investigation. (Author)

AD-A075 329/3 PC **A04**/MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. Beaverdam Creek Dam (VA-01903), Bedford County, Virginia. Phase I Inspection Report.
Final rept.,
James A. Walsh. Jul 79, 53p

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 330/1 PC **A03**/MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. White Oak Creek Dam (Zarahemla) (05104), Big Sandy River Basin, Dickenson County, Virginia. Phase I Inspection Report.
Final rept.,
James A. Walsh. Aug 79, 43p

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 331/9 PC **A03**/MF **A01**
Army Engineering District Norfolk Va
National Dam Safety Program. Kennedy Dam (VA-17910), Rappahannock River Basin, Stafford County, Virginia. Phase I Inspection Report.
Final rept.,
James A. Walsh. Sep 79, 38p

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 332/7 PC **A03**/MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Coleman Falls Dam (VA-00903), Upper James River Basin, Amherst County, Virginia, Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 43p
Contract DACW65-78-D-0015

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 333/5 PC **A03**/MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Scotts Mill Dam (VA-68001), Upper James River Basin, Lynchburg, Virginia. Phase I Inspection Report.
Final rept
Aug 79, 46p
Contract DACW65-78-D-0015

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I in-

vestigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 334/3 PC **A03**/MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Upper Beaver Pond Dam (VA-04135), Middle James River Basin, Chesterfield County, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 41p
Contract DACW65-78-D-0015

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 335/0 PC **A03**/MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Timber Lake Dam (VA-05918), Potomac River Basin, Fairfax County, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 43p
Contract DACW65-78-D-0015

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 336/8 PC **A03**/MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety program. Lake View Dam (VA-04119), Middle James River Basin, Chesterfield County, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 37p
Contract DACW65-78-D-0015

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 337/6 PC **A03**/MF **A01**
Martin (Deward M) and Associates Inc Williamsburg Va
National Dam Safety Program. Gregory's Pond Dam (VA-04122), Middle James River Basin, Chesterfield County, Virginia. Phase I Inspection Report.
Final rept.,
Paul Seiler. Aug 79, 36p
Contract DACW65-78-D-0015

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies. Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

AD-A075 475/4 PC **A02**/MF **A01**
Cold Regions Research and Engineering Lab Hanover Nh
Tundra Lakes as a Source of Fresh Water: Kipnuk, Alaska.
Special rept.,
Stephen R. Bredthauer , and Duane F. Doerflinger. Sep 79, 19p Rept no. CRREL-SR-79-30
Grant PHS-243-76-0206

A study of water quality in several small tundra lakes near Kipnuk, Alaska, was conducted to determine if the lakes were of sufficiently high quality during the snowmelt season to provide the village with enough water for a year-round supply. Since the village is located just 4 miles inland from the Bering Sea, primary emphasis was placed on locating water sources with low chloride concentrations. The tundra lakes were of sufficiently high quality to be pumped into a storage area during early summer to be used as a year-round supply. (Author)

AD-A075 508/2 PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Annapolis Md Ship Materials Engineering Dept
Soil Disposal of Organotin-Contaminated Grit Waste.
Research and development rept.,
L. R. Harris , C. Andrews , D. Burch , D. Hampton , and S. Maegerlein. Sep 79, 55p Rept no. DTNSRDC/SME-78/2A

Organotin compounds currently are used in some antifouling paint formulations. Waste disposal problems occur when these chemicals become mixed with abrasive grit during ship hull cleaning operations. Landfilling is one means of disposal; however, organotins may leach through soil, causing potential ground water pollution. An experimental study was undertaken to determine the leaching behavior and migration of organotin compounds through clay, topsoil, and sand. Waste-contaminated grit, obtained from Navy shipyards, was buried in lysimeters. After 16 weeks of receiving simulated rainfall, the leachate tin content of each lysimeter was no higher than the background leachate tin content measured prior to grit addition. All soils had a strong affinity for the organotin compounds. Horizontal and vetical migration was observed for the clay and topsoil. The sandy soil showed mostly vertical migration. Core samples of these lysimeters, shaken with water and centrifuged, did not show any toxicity in tests on guppies. Based on the results of this study, soil disposal of spent abrasive grit containing organotin compounds could be an effective interim method. (Author)

AD-A075 590/0 PC **A08**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Oh School of Systems and Logistics
A Model of the Base Civil Engineering Work Request/Work Order Processing System.
Master's thesis,
Walter A. Arnold , and Dean G. Fogleman. Sep 79, 161p Rept no. AFIT-LSSR-19-79B

Base Civil Engineering is tasked with constructing, repairing, maintaining, and operating real property facilities. Within these areas falls most of the work which is accomplished by work order. Presently, Civil Engineering has no model for estimating work order completion time or for testing changes to the work order processing system. This research identifies the variables that significantly affect the accomplishment time and proposes a prototype model designed to predict this completion time. An extensive analysis was conducted to systematize the general structure of the work request/work order processing system and its behavior with respect to work order processing time. A conceptual model was developed to describe the work request/work order processing system as a stochastic queueing system in which the processing times and the various distributions are treated as random variables. Historical data was collected from Barksdale Air Force Base. An attempt was made to operationalize the conceptual model using the Q-GERT Network Analysis Program. The results of the model were inconclusive due to limits the Q-GERT object program. However, the procedures to overcome these limitations are presented and discussed. (Author)

BNL-50867 PC **A04**/MF **A01**
Brookhaven National Lab., Upton, NY.
Workshop Report on Quantifying Environmental Damage from Energy Activities.
P. D. Moskowitz, M. D. Rowe, S. C. Morris, and L. D. Hamilton. 11 Sep 77, 71p
Contract EY-76-C-02-0016

Data and methods for quantifying environmental damage from energy activities were evaluated. Specifically, discussions were designed to identify the types and amounts of pollutants emitted by energy technologies that may affect the environment adversely, methods of estimating spatial and temporal changes in air and water quality resulting from these emissions, spatial and temporal distributions of ecosystems at risk, dose-response functions for pollutants and ecosystems at risk, and environmental and economic variables to be used to measure damage. Emphasis was on available data and on several methods for quantitative estimation of effects of energy on the environment. Damage functions that could be used to quantitate effects of ozone and sulfur oxide on agricultural crops and trees, effects of altered stream depth and velocity patterns on river fish species,

and sensitivities of lake chemistry and biology to acid rainfall are listed. Also described are methods for estimating effects of carbon dioxide, sulfur dioxide, ozone, and several other atmospheric pollutants on selected terrestrial communities by using computer modeling techniques. With these techniques, quantitative estimates of the effects of energy on the environment could be developed within one to two years. Brief discussions about effects of nutrient and trace metal discharges on terrestrial ecosystems and about impacts of petroleum hydrocarbon, heat, biocides, and entrainment on aquatic ecosystems are also included. (ERA citation 04:052147)

DOE/ET-0012/2(Rev.) PC **A16**/MF **A01**
Department of Energy, Washington, DC. Div. of Electric Energy Systems.
Systems Engineering for Power. Program Report.
Jun 79, 372p

The central objective of the program is to develop and make available to the electric utility industry the conceptual tools needed for the planning, engineering, and operation of the electric energy systems of the future. The perceived increase in complexity is being driven by three trends, each of which compounds the others. An increasing degree of interconnection between operating areas; development of new technologies; and a continual tightening of the constraints within which the electric energy system must operate, including financial, environmental, and conservationn constraints are perceived. Each of these driving forces has implication for system operation (control) and for system design (planning). This report defines the subprograms which have thus far been developed for control and planning. Systems control subprograms concern more efficient, economical operation; operation within smaller reserve and stability margins; control of unconventional elements; and improved modeling and simulation capability. Systems development and forecasting subprograms concern improved systems structuring; improved systems analysis; and improved forecasting and planning means. (ERA citation 04:051821)

N79-32751/6 PC **A04**/MF **A01**
Saarbergwerke A.G. Saarbrueken (Germany, F.R.). Hauptabt. Forschung und Entwicklung, Umweltschutz.
Engineering Study of the Flue Gas Desulfurization Unit for the Power Plant Weiher 3.
Final Report, Jun. 1977.
F. Hofmann, H. Igelbuescher, and G. Scholl. Dec 78, 55p BMFT-FB-T-78-28
Contract BMFT-03E-1012/ETS-6000-A
In German; English Summary.

Following the experience gathered during operation of the test facility for flue gas desulfurization at the Weiher 2 power station, the possible construction of a fullscale plant was examined. Results show that with a few exceptions the successful concept of Weiher 2 can be retained as well as the equipment and aggregates used there. The technology transfer of the experience gathered at the test facility for a flue gas throughput of 125,000 m3/hr to the projected plant is shown to be feasible. In individual cases improvements are possible regarding the equipment and aggregates. For example the installation of the fan (now preceding the plant) or the general use of shallow bottoms for the tanks instead of hopper gates is discussed.

N79-32752/4 PC **A03**/MF **A01**
Oxford Univ. (England). Dept. of Engineering Science.
River Quality Models Near Outfalls.
C. J. Harris. 1978, 48p OUEL-1270/78

Mathematical models of urban water runoff, the activated sludge process, and of river quality are derived and simulated. The analytic and practical problems encountered in the development of dynamic models of composite water quality are briefly reviewed. These techniques used in the modeling and control of river water quality near effluent outfalls, are illustrated using hypothetical urban examples. An advection-diffusion equation is used to describe conversion of matter in this pollution phenomenon. Urban and overland pollutant flow models are derived. The contribution of wastewater treatment plants to overall river pollution is demonstrated. The use of these mathematical models to control river water quality is suggested.

N79-33106/2 PC **A04**/MF **A01**
National Swedish Road and Traffic Research Inst., Linkoeping.
Chemical de-Icing of Roads: The Effect on Road Accidents.
K. Andersson. 1978, 51p VTI-145
In Swedish; English Summary.

Three attempts to trace the effects of chemical deicing methods (salting) on traffic accidents are reported. Only police reported accidents on national roads during the winter are taken into account without distinction as to severity. An analysis of variance conducted between 1970 and 1974 does not show that salting effects the total number of accidents. Another analysis based on the road conditions in the winter of 1973 shows that on ice/snow the accident rate is 3 to 20 times higher than on dry ground, but this rate increases under light ice/snow conditions due to a surprise factor. A before-after study conducted in 1972 through 1973 and 1974 through 1975 on salted and unsalted roads shows that the accident rate is not changed by salting. However, as this is a nonexperimental study no firm conclusions can be drawn.

PB80-102122 PC **A18**/MF **A01**
Montana Bureau of Mines and Geology, Butte.
Regional Assessment of the Saline-Seep Problem and a Water-Quality Inventory of the Montana Plains.
Open file rept.,
M .R. Miller, R. N. Bergantino, W. M. Bermel, F. A. Schmidt, and M. K. Botz. 1978, 401p OFR/HY-78/2
Grant OWRC-10570034
Sponsored in part by Montana State Dept. of Health and Environmental Sciences, Helena. Water Quality Bureau, and Montana Dept. of State Lands, Helena.

The regional water-quality inventory of the Montana Plains suggests that significant water-quality deterioration has occurred in the glaciated portion of Montana where dryland farming has been practiced for many years. The regional survey of wells, springs, streams, and reservoirs was conducted over a 42-county area encompassing roughly 118,000 square miles. More than 2,800 sites were evaluated in the field and 452 water samples were collected, of which 247 were analysed for trace elements. Specific conductance of the water ranged from 1,000 and 10,000 micromhos per centimeter at 64 percent of the sites. The aerial reconnaissance survey indicated that the previous estimate of 200,000 acres of saline seep in Montana is somewhat low. The survey showed that there were considerably more affected acres in northern and central Montana than formerly thought, and, conversely, that southern and eastern Montana contained fewer seep acres.

PB80-102551 PC **A10**/MF **A01**
Radian Corp., Austin, TX.
Environmental Assessment: Source Test and Evaluation Report - Wellman-Galusha (Glen Gery) Low-Btu Gasification.
Final rept. Jan 78-May 79,
W. C. Thomas, K. N. Trede, and G. C. Page. Aug 79, 213p EPA/600/7-79/185
Contract EPA-68-02-2147

The report gives results of a Source Test and Evaluation Program at a commercial coal gasification plant using a Wellman-Galusha gasifier to produce low-Btu fuel gas from anthracite coal. Major objective of the tests was to perform an environmental assessment of the plant's waste streams and fugitive emissions. Results of the chemical analyses of the plant's waste streams indicated that all contained organic and/or inorganic components which may have potentially harmful health and/or ecological effects. In the pokehole and coal hopper gaseous emissions, CO, NH3, and possibly Fe(CO)5 were found to be of major concern. Organic compounds which were not specifically identified were of potential concern in the ash sluice water. The gasifier ash and cyclone dust contained a number of trace elements and possibly organics that may be potentially harmful. Analyses of the leachate from these two solid waste streams indicated that the leachate may have potentially harmful health and/or ecological effects; however, at a substantially lower level of concern when compared with the results of the ash and dust themselves. Overall, the indicated potential health and ecological effects of the plant's waste streams were found to be significantly lower than those for waste streams produced by gasifying bituminous coals.

PB80-102601 PC **A05**/MF **A01**
Southwestern Public Service, Co., Amarillo, TX.
Fabric Filter System Study: First Annual Report.
Annual rept. Oct 77-Oct 78,
K. L. Ladd, G. R. Faulkner, and S. L. Kunka. Aug 79, 81p EPA/600/7-79/183
Contract EPA-68-02-2659

The report describes first-year activities of a comprehensive EPA-funded study of a commercial fabric filter unit on a 350-MW low-sulfur-coal-fired unit at Southwestern Public Service Company's Harrington Station at Amarillo, Texas. Two years will be required to complete collection and assessment of 1 full operating year's worth of data. Following the testing phase of the program, operational and maintenance data will continue to be recorded until 1982 to determine the long-term reliability of the system. Special tests will be conducted through the use of an onsite pilot baghouse. First-year activities include installation of support systems, startup of the full-scale fabric filter system, and planning for special test programs. Special testing on the full-scale system began in February 1979. Results will be included in the next annual report.

PB80-102809 PC **A06**/MF **A01**
Robert S. Kerr Environmental Research Lab., Ada, OK.
Indicatory Fate Study.
Final rept. May 78-Feb 79,
Leon H. Myers, Thomas E. Short, Jr., Bill L. DePrater, Fred M. Pfeffer, and Donald H. Kampbell. Aug 79, 105p EPA/600/2-79/175

This report is concerned with media disposition of specific priority pollutants. Composite samples were obtained from the influent, effluent, residuals, and air from 12 industrial biological treatment systems. These samples were extracted and analyzed by gas chromatography for organic constituents, by atomic absorption for metals, and by EPA methodology for phenolics, cyanide, and mercury. Participating industries included: (1) organics and plastics, (2) pharmaceuticals, (3) pesticides, (4) rubber, (5) wood preservative, and (6) petroleum refining. The data in this report represent potential disposition of specific priority pollutants during 3-day study periods and should not be construed to represent a mass balance study.

PB80-102825 PC **A08**/MF **A01**
Reed and Barton Silversmiths, Taunton, MA.
Group Treatment of Multicompany Plating Wastes: The Taunton Silver Project,
Henry C. Gill, J. H. Shockcor, and Marsha Gorden. Jul 79, 168p EPA/600/2-79/102
Grant EPA-S-805181
Prepared in cooperation with Development Sciences, Inc., Sagamore, MA., and Shocker (J. H.), Woodstock, VT.

The requirements for industrial pretreatment will limit the entrance of metals into municipal treatment facilities in many communities. Within a city or region, opportunities for grouping waste streams from several similar companies for combined treatment may exist. This project was designed to consider three companies from the metal-related field in the City of Taunton, Massachusetts, as possible candidates. The intent was to explore the treatment technology applicable to this segment of the electroplating industry in order to determine the potential for cost savings with group treatment and also to develop the legal and institutional arrangements necessary for successful implementation and operation. Technical and economic data are presented on individual control alternatives for each of the three companies as well as on group treatment, with several variations for concentrated wastes and sludges. In addition,

the potential for material recovery and water reuse within the various control alternatives is developed. Finally, the appropriate institutional and financial factors for ownership and operation of an industrial group treatment facility are described. The project is an outgrowth of a Section 208 (PL 92-500) areawide wastewater management plan under development by the Southern Regional Planning and Economic Development District (SRPEDD) of Massachusetts as an alternative approach to meeting pretreatment requirements. The materials in the report are designed to assist the companies in determining whether they should treat particular elements of their waste separately or jointly.

PB80-102882 PC **A04**/MF **A01**
Monsanto Research Corp., Dayton, OH.
Analysis of Priority Pollutants at a Primary Zinc Production Facility.
Final rept. Mar 78-Jan 79,
T. J. Hoogheem, and G. D. Rawlings. Apr 79, 56p MRC-DA-862, EPA/600/2-79/093
Contract EPA-68-03-2550

As a result of the 1976 consent decree (Natural Resources Defense Council et al. v Train suit), EPA is obligated to identify which of the 129 priority pollutants are present in industrial wastewaters and to determine the ability of various wastewater treatment technologies to remove these pollutants. This project investigated the source of priority pollutants, assessment of the wastewater treatment plant, and priority pollutant removal efficiency for a single primary zinc manufacturing plant. Forty-eight hour composited samples were collected from the following streams: (1) plant intake water, (2) sanitary discharge, (3) gas scrubber wastewater, (4) lagoon wastewater, and (5) plant effluent. The plant treats all process, sanitary, and storm run-off wastewater in a lime precipitation/solids clarification treatment plant. Results indicate high levels of zinc, cadmium, and chrome being generated but being removed to acceptable state requirements by the treatment plant. Low levels of several priority pollutant organics were found, originating either in the city water supply or being generated chemically within the manufacturing plant.

PB80-102916 PC **A13**/MF **A01**
Central Research and Design Inst. for Open-Pit Mining, Wroclaw (Poland).
Reclamation of Alkaline Ash Piles and Protection of Their Environment Against Dusting.
Final rept.,
Wladyslaw Wysocki. Jul 79, 279p EPA/600/7-79/128

The objective of this study was to develop methods to reclaim and stabilize by vegetation fly ash and bottom ash from bituminous and lignite fired power plants. The ash had been transported from the power plant as a slurry and disposed of in ponds. Ashes from these power plants were strongly alkaline (pH from 8.5 to 12.8). Greenhouse experiments were conducted using white mustard (Synapis alba L.) as the test plant on ashes treated by various fertilizers, with various moisture levels and with application of amendments changing the composition or the properties of ash. Three years field experiments were performed to investigate the growth, health, yields and quality of mixtures of legumes and grasses growing on ashes with admixtures changing their composition or properties. Different fertilization levels were also studied. A 3-year field investigation of the growth and health of selected species of trees, bushes and cuttings was conducted. On the base of periodical pedological microbiological and phytosociological examination the process of the soil formation was observed. Field experiments were carried out in a moderate climate, where significant air pollution, dusts, and gases were emitted from nearby power plants burning bituminous coal or lignite. Along with the results of the greenhouse and field investigations, recommendations for ash reclamation are presented.

PB80-104995 PC **A02**/MF **A01**
Environmental Protection Agency, Ann Arbor, MI. Technology Assessment and Evaluation Branch.
Evaluation of Exhaust Collection Configuration on Diesel Particulate Measurement.
Technical rept.,
Thomas Penninga. May 79, 12p 79-8, TAEB-79-8

On February 1, 1979, the EPA published proposed rules regulating particulate emissions for light-duty diesel vehicles. Questions both internal and external to EPA concerning the practicality and necessity for these requirements resulted in the initiation of a testing program. The test data was run according to the proposed Federal Register requirements for both FTP and HFET cycles. The two test vehicles were a 1975 Mercedes Benz 300D and a 1979 Oldsmobile 350 CID Diesel. Five different configurations of exhaust collection hardware were tested. The two vehicles were tested twice in each configuration. Previous testing programs had established a baseline particulate emission number for each vehicle. All of the individual FTP and HFET tests results are tabulated. The average FTP and HFET results for each configuration were calculated and compared to both the baseline data average, if available, and to the average result of this study. No baseline HFET data was available. In conclusion, there appears to be direct correlation between collection configurations and mass particulate emissions.

PB80-105166 PC **A08**/MF **A01**
Union Carbide Corp., South Charleston, WV. Chemicals and Plastics.
Treatment of Organic Chemical Manufacturing Wastewater for Reuse.
Final rept. Apr-Dec 76,
Michael Scherm, Patrick M. Thomasson, Lester C. Boone, and Lawrence S. Magelssen. Aug 79, 173p EPA/600/2-79/184
Grant EPA-S-801398

This research demonstrated the quality of water produced by each step of a state-of-the-art, commercially available process sequence and determined the feasibility and economics of renovating organic chemical watewater for reuse as boiler feedwater or cycle cooling water. The 5-gpm pilot facility, located in Puerto Rico in the organic chemical manufacturing plant of Union Carbide Caribe Inc., consisted of sedimentation/filtration, carbon adsorption, pressure filtration, reverse osmosis, and ion-exchange. A pilot-scale boiler tested the product water as boiler feedwater at pressures, temperatures, and heat fluxes typical of full-scale manufacturing facilities. A pilot-scale cooling tower and heat exchangers determined feasibility as cycle cooling water makeup and chemical treatment requirements for makeup waters of varying quality from different points in the treatment sequence. The pilot boiler operated successfully at 180,000 BTU/sq ft-hr, 1500 psig, and 750 F superheat temperature with renovated wastewater. The cooling water test-loop studies indicated that special metallurgy would be required for the use of this renovated wastewater for cooling water. The total annualized cost of wastewater renovation to boiler feedwater quality at 67 percent water recovery, not including the cost of sludge or brine disposal, was $7.50/1000 gallons of product water in 1978.

PB80-105406 PC **A03**/MF **A01**
Maine Dept. of Transportation, Augusta.
Transportation Improvement Program, Construction, Support, Services (Maine).
Rept. for 1980-81.
1979, 31p

The proposed Transportation Improvement Program set forth for the 1980-81 Biennium includes activities in airports, public transportation, railroads, and waterways. The program is submitted to the Governor and the 109th Maine Legislature to describe the program and funding level recommended for capital investments and major service improvements in transportation modes funded from the General Fund within the jurisdiction of the Department of Transportation.

PB80-105604 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Undercounting of Vehicles with Single Loop-Detector Systems,
Patricia H. Bellamy. c1979, 16p TRRL-SUPPLEMENTARY-473
Also pub. as ISSN-0305-1315.

The use of a single loop-detector system on a multi-lane road is bound to result in undercounting. This Report describes a theoretical method of calculating the probability of a vehicle not being detected under these circumstances and compares the results with 'real' traffic count data collected by several authorities. For all the data examined the theoretical approach gives similar undercounting errors to those actually observed and hence is a useful method of estimating these errors when 'real' data is not available. (Copyright (c) Crown Copyright 1979.)

PB80-105711 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Peak Public Transport: An Area Study,
R. L. Jackson, and P. H. Martin. c1979, 24p TRRL-LR-885
Also pub. as ISSN-0305-1293.

A study of the supply of and demand for peak public transport services in an area centered on the large free-standing town of Northampton is reported. Two publicly-owned bus companies supplied virtually all the stage services within the area while, by contrast, 24 privately-owned bus and coach companies supplied the vast majority of the numerous contract services to schools and workplaces. In the morning peak the two groups of companies ran comparable numbers of in-service vehicle-kilometers in their respective areas of operation. While the publicly-owned companies carried about twice as many passengers as the private ones they generally catered for shorter journeys so that the numbers of passenger-kilometers carried by the two groups were comparable. A smaller though significant amount of transport was provided for workers by employer-owned vehicles. Fares were not charged at all on the majority of works services and on many of the remainder were only nominal so employers were shown to provide substantial financial support for public transport within the study area, alongside the County Councils (who provided the overwhelming majority of school services) and central government. There was judged to be only very limited competition between the stage buses and other services. (Copyright (c) Crown Copyright 1979.)

PB80-105729 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Measurement of the Eye Heights of British Car Drivers Above the Road Surface,
C. M. Haslegrave. c1979, 16p TRRL-SUPPLEMENTARY-494

Roadside photographs taken in conjunction with an anthropometric survey were used to determine the distribution of eye heights of British car drivers. Drivers were sampled on the roads used in the traffic census carried out by TRRL, covering urban and rural sites in England, Scotland and Wales. Comparison with estimates of eye heights made in 1962 suggest that there has been a considerable decrease in eye height in the last fifteen years. The present United Kingdom eye height criterion adopted for geometric design corresponds to the 4th percentile eye height of the drivers sampled. The project was carried out under contract to the Transport and Road Research Laboratory by the Vehicle Safety Department of the Motor Industry Research Association. (Copyright (c) Crown Copyright 1979.)

PB80-105760 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Car-Sharing and Car-Pooling in Great Britain: The Recent Situation and Potential,
R. A. Vincent, and K. Wood. c1979, 21p TRRL-LR-893

This Report reviews the character of passenger travel by car in Great Britain using, in particular, results derived from the National Travel Survey 1975/76. Car passengers who travel in a car belonging to another family account for as many passenger kilometers as all stage-carriage bus services. Car-poolers, who take it in turns to drive their own car and give lifts to others in the group, are only about 3 per cent of those who drive a car to work. Most passengers in non-household cars are regular passengers (car-sharers) who do not have the option of driving themselves. The families of car-poolers appear to make little use of the car on

the days it is left behind for use off-peak, only about 10 km/week on average. Nor do they appear to make fewer off-peak bus trips than families where all the cars are taken to work. The Report attempts to quantify the effects of a hypothetical 10 per cent increase in peak pericd car occupancy. Nst community benefits in excess of 100 pounds sterling M pa are estimated, with large savings in car travel and traffic congestion for increased car pooling, or in peak bus and rail provision if car-sharing increases. Though difficult to quantify, such an increase appears likely to occur only in extreme circumstances, particularly in the light of a trend for car occupancies to decrease. (Copyright (c) Crown Copyright 1979.)

PB80-105786 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Rural Transport Experiments: The Welsh Schemes. A Report by the Dinefwr Rutex Working Group.
c1979, 24p TRRL-SUPPLEMENTARY-507

The public transport experiments were conducted in Wales as part of the RUTEX programme, all based on Llandovery in Dyfed. This report describes the planning, operational and financial aspects of the experiments. The three schemes complemented each other and existing services, and had the objective of improving transport provision by means of low-cost options making efficient use of existing resources. The three services were as follows: (1) A postbus served two routes, and operated in typical fashion, providing a service most suitable for shopping and personal business trips. The experimental provision of a two-way Saturday service attracted very little patronage. (2) Spare capacity on four schoolbus routes was made available to the public. These routes were only available during term-time, and attracted only a small group of users, but they were able to cater for certain work journeys, and were provided at very low cost. (3) A voluntary car service was provided over the whole designated area, organized and operated by the Women's Royal Voluntary Service. The service was free to passengers, but available only for 'essential' purposes. Despite some uncertainty about permissible purposes, the scheme provided a valuable service, and coped economically with dispersed and unpredictable demands. (Copyright (c) Crown Copyright 1979.)

PB80-105794 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Trials of a Modified Specification for Compacting Dense Roadbase and Basecourse Coated Macadam,
D. Leech. c1979, 25p TRRL-LR-891

Previous research has led to the formulation of revised specification clauses for the compaction of dense roadbase and basecourse coated macadams which, if implemented fully, should result in improvements in compaction in the critical wheelpath zones of about 3 percent; this would bring about a worthwhile improvement in pavement performance. The revised specification has been applied in four contracts for the construction and reconstruction of motorways. Improvements in compaction of between 1 and 2 percent were obtained suggesting that, in practice, the specification was being only partly implemented. Comparison of these results with densities achieved in a laboratory compaction test to establish the practical or refusal limit of compaction shows that there is considerable scope for additional compaction on site. Improved compaction is discussed in terms of the major controllable factors in the compaction operation, i.e. method of rolling, laying temperature and layer thickness. If the benefits of levels of compaction close to refusal are to be realized this will normally require the maintenance of laying temperatures close to the permitted maximum, avoidance of thin layers and more effective compaction plant used according to the amended specification. (Copyright (c) Crown Copyright 1979.)

PB80-105877 PC **A04**/MF **A01**
New Mexico Water Quality Control Commission, Santa Fe.
Continuing Planning Process for Water Quality Management - The State of New Mexico.
Mar 76, 55p

The report describes the water policy objectives, the planning program elements, and the planning procedures for the state of New Mexico.

PB80-105950 PC **A02**/MF **A01**
Northeastern Forest Experiment Station, Upper Darby, PA.
Non-Game Wildlife Research in Megalopolis: The Forest Service Program.
Forest Service general technical rept. (Final),
Jack Ward Thomas, and Richard M. DeGraaf.
1973, 15p NEFES/80-2, FSGTR/NE-4

The management of city habitats for wildlife production for enjoyment in forms other than hunting will require extensive coordinated research to provide guidance for such efforts. A generalized framework for such research is suggested and thirteen research studies particularly suited to the Forest Service research unit at Amherst, Mass., are outlined.

PB80-105992 PC **A03**/MF **A01**
Illinois State Water Survey, Urbana.
Water Withdrawals in Illinois, 1978,
James R. Kirk, Jacquelyn Jarboe, Ellis W. Sanderson, Robert T. Sasman, and Robert A. Sinclair. 1979, 40p ISWS/CIR-140/79, W80-00722
Prepared in cooperation with Illinois Inst. of Natural Resources, Springfield, and Illinois State Geological Survey, Urbana.

This report, part of a continuing cooperative program with the U.S. Geological Survey, summarized the results of the 1978 Illinois Water Use Inventory. The water use data were presented for the following categories: Public Water Supply (1770.9 mgd), Self-Supplied Industry (44,331.0 mgd), Rural Water Use (220.0 mgd), and Fish and Wildlife Management Areas (44.2 mgd). The data were then further categorized by county, districts, hydrologic units, and Standard Metropolitan Statistical Areas.

PB80-106008 PC **A03**/MF **A01**
Massachusetts Executive Office of Environmental Affairs, Boston.
Massachusetts Coastal Zone Management, Information/Education.
1976, 30p

Public participation, as it developed in Massachusetts, was a part of the planning process for coastal zone management. Planning decisions, planning concepts and choosing among management alternatives were all public activities. The goal was to improve the plan by making program development a public process. Citizens and officials throughout Massachusetts were asked to lend their experience, knowledge, and concern to Massachusetts. The report describes the activities related to the planning process for the coastal zone.

PB80-106222 PC **A03**/MF **A01**
Transportation Systems Center, Cambridge, MA.
Service and Methods Demonstration Program. Executive Summary.
Annual rept. Oct 77-Sep 78,
Bruce D. Spear, Robert Casey, Don Kendall, Marian Ott, and Elizabeth Page. Aug 79, 43p UMTA-MA-06-0049-79-7
See also report dated Jul 78, PB-292 008.

The objectives of the program are to: (1) provide more efficient and effective public transportation service; (2) bring about the use of local regulatory and pricing authority to encourage ridesharing and transit use; (3) develop a mix of innovative transit service models that appeal to a wide range of user groups; (4) integrate the use of private and public providers into a comprehensive set of public transportation services; (5) develop information to assist local, state, and Federal policy formulation; (6) guide an improved level of local response to UMTA regulations concerning transportation system management (TSM), elderly and handicapped, and Alternatives Analysis. This Executive Summary contains a summary of the contents of the Service and Methods Demonstration Program Annual Report for fiscal year 1978.

PB80-106263 PC **A05**/MF **A01**
Connecticut Dept. of Transportation, Wethersfield. Bureau of Highways.
Pavement Recycling-Bituminous Concrete and Concrete Mix Designs.
Interim rept. Oct 78-Mar 79,
Robert Christman, and Keith Lane. Jul 79, 76p FHWA/CT-569-1-79-10

Trial mixes developed from both salvaged bituminous-concrete and portland-cement concrete pavement materials were tested in the laboratory. Salvaged materials investigated included crushed and cold-milled bituminous concrete and crushed 40 x 12-ft concrete pavement slabs with wire-mesh reinforcing. Laboratory results indicated the feasibility of full-scale bituminous recycling projects using central-plant mixing of salvaged and virgin aggregate by the heat-transfer method and both in-place full-depth and surface recycling. The concrete tests provided good results in terms of strength properties and demonstrated the potential of concrete recycling. Mesh separation and removal did not present any insurmountable problems. Experimental design and specifications for full-scale field projects are included for both recycled concrete and bituminous concrete, together with a plan for post-construction evaluation of the various recycled pavements.

PB80-106305 PC **A11**/MF **A01**
Massachusetts Dept. of Environmental Quality Engineering, Westborough. Div. of Water Pollution Control.
Water Quality Monitoring Program of the Metropolitan Area Planning Council's 208 Management Area.
Data rept.
Nov 77, 229p

The Massachusetts Division of Water Pollution Control, in cooperation with the Metropolitan Area Planning Council (MAPC), undertook during 1977 an extensive water quality monitoring program in the major river basins of the MAPC 208 management area. This program was multi-faceted with water quality sampling of surface waters, sampling of stream sediments, and sampling of benthic invertebrates. In addition, a special survey was conducted in Marblehead Harbor to assess the impact of vessel discharges and to determine the overall water quality of this popular and extensively used harbor. This report presents the results of the analyses performed on the hundreds of samples collected during the duration of this project. Chemical analyses were performed at the Lawrence Experiment Station.

PB80-106404 PC **A07**/MF **A01**
Kentucky Bureau of Highways, Lexington. Div. of Research.
Statewide Survey of Skid Resistances of Pavements, 1978.
Interim rept.,
Rolands L. Rizenbergs, and James L. Burchett. Jul 79, 141p RR-528
See also report dated Nov 78, PB-298 647.

Statewide survey of skid resistances continued in 1978 with the testing of 2,943 miles (4,736 km) of state primary roads and 2,405 miles (3,870 km) of state secondary roads. About 10 percent of both the state primary mileage and the state secondary mileage had an average skid number of 28 or less. These pavements, in particular, should be considered for de-slicking. In 1977 and 1978, 35 percent of the mileage of rural, state-maintained roads in Kentucky were surveyed. These roads carried 87 percent of all traffic on rural, state-maintained roads.

PB80-106735 PC **A05**/MF **A01**
Maine Dept. of Transportation, Augusta. Bureau of Safety.
State of Maine Highway Safety Plan for Fiscal Year, 1979.
1979, 94p

The objective of the Maine Highway Safety Plan (HSP) is to coordinate, in the most cost effective manner possible, the many diverse highway safety related activities to be undertaken during the fiscal year 1979 (October 1, 1978 - September 30, 1979). These activities, should have a positive impact on the primary mission of the program, namely the reduction of 'traffic accidents, deaths, injuries and property damage resulting therefrom,' as mandated by the Congress of the United States

in 1966. The goal of this five year plan is to reduce the mileage death rate from 2.80 to 2.00 deaths per 100 million miles of vehicular travel by 1982. The immediate objective for fiscal year 1979 is the reduction of the death rate from 2.80 to 2.65 and a reduction of the injury rate from 170.67 to 165.0. It is hoped that by 1982 the injury rate can also be reduced to 150.0.

PB80-107022 PC **A12**/MF **A01**
PRC Systems Sciences Co., McLean, VA.
Intermodal Management Information System (IMIS). Phase III, Task 1: Baseline Specification.
Final rept.,
J. Peternick, V. Frederickson, A. Pflugrad, B. Rynders, and D. Dillenback. Sep 79, 267p PRC/SCC-C02936, FRA/ORD-79/21
Contract DOT-FR-741-5157
Prepared in cooperation with Norfolk and Western Railway Co., VA.

The document presents the system design of the IMIS. To assist the potential user in assessing system capabilities, it describes what the system will do and what a user must provide. The document is also a tool for the application analyst/programmer to use in developing detailed specifications and computer programs. A top-down design was accomplished, utilizing structured design techniques to describe the system in terms of its logical functional components. The system is modular and includes those functions considered critical to effective management and control of intermodal activities. It is a composite of three systems which can be used together or individually. These are (1) an intermodal equipment control system, (2) a repetitive waybilling and rating system, and (3) a profit analysis system. Each system functions independently of the others and may be used to interface with relevant information systems that already exist or are planned for the railroad. A major system objective is to supply a foundation or baseline from which the railroad may draw those features desired for its own situation. The design is constructed to permit supplemental functions to be readily incorporated by a railroad, if desired.

PB80-107170 PC **A19**/MF **A01**
Wyoming Recreation Commission, Cheyenne.
An Outdoor Recreation Plan for Wyoming,
Peter J. McNiff, and Clynn Phillips. Jun 75, 431p
Sponsored in part by Bureau of Outdoor Recreation, Washington, DC.

The purpose of the 1975 State Comprehensive Outdoor Recreation Plan (SCORP) is to provide a guideline for outdoor recreation development in Wyoming. The planning process that ultimately produced this document, called the 1975 State Comprehensive Outdoor Recreation Plan (SCORP), was guided by the following goals: (1) To acquire recreation lands and water, to develop, operate and maintain required facilities, and to assist other public agencies in these actions in order to provide recreation opportunities for Wyoming's citizens and the out-of-state visitors that come to Wyoming to recreate; (2) To acquire, protect, preserve and develop areas and sites of significant historical value and areas of outstanding or unique natural characteristics; (3) To protect and preserve, through proper development and utilization, the environmental and wildlife resources that combine to give Wyoming a rich and abundant recreation resource endowment; (4) To develop programs that will encourage participation in outdoor recreation, develop an appreciation of the State's historical and cultural heritage and create an awareness of and an appreciation for nature and the human role in the natural environment.

PB80-107212 PC **A08**/MF **A01**
Hensley-Schmidt, Inc., Jackson, MS.
Mississippi Statewide Public Transportation Study.
Final rept.,
Kay Van Sickel, and Kenneth W. Heathington. Jun 78, 172p
Sponsored in part by Urban Mass Transportation Administration, Washington, DC., and Mississippi State Highway Dept., Jackson.

The study identifies rural and urban public transportation needs and presents recommendations for better needs assessments, coordination of resources and management of federal, state and regional transportation programs.

PB80-107501 PC **A04**/MF **A01**
General Accounting Office, Washington, DC. Energy and Minerals Div.
How to Burn Coal Efficiently and Economically, and Meet Air Pollution Requirements - The Fluidized-Bed Combustion Process.
Report to the Congress.
9 Nov 79, 56p EMD-80-12

This report discusses the Department of Energy's program to demonstrate fluidized-bed coal combustion and ways the program could be improved. It specifically recommends that the Secretary of Energy: (1) enter into an interagency agreement with the Department of Defense to place industrial demonstration plants in Defense industrial facilities and (2) enter into an interagency agreement with the Tennessee Valley Authority for hosting the 200-megawatt utility demonstration plant. It also discusses the questionable need and utility of a component test and integration unit and suggests options for terminating the contracts and selling or modifying the facility for other uses.

PB80-107899 PC **A99**/MF **A01**
National Marine Fisheries Service, Galveston, TX. Galveston Lab.
Environmental Assessment of an Active Oil Field in the Northwestern Gulf of Mexico, 1977-1978. Volume III: Chemical and Physical Investigations.
Annual rept. 1977-78,
William B. Jackson. Sep 79, 722p NOAA-79092004
Sponsored in part by Environmental Protection Agency, Washington, DC.

This report contains detailed scientific and technical information on the results of chemical and physical investigations of the operating Buccaneer Oil Field off Galveston, Texas. The tasks of the various work units are identified as follows: To identify and document the extent and types of biological, chemical, and physical alterations in the marine ecosystem that are associated with the development of and production of discharges from an oil field; to describe the fine sediments and nepheloid layer of the oil field, focusing upon their relationship to heavy metal adsorption; to determine levels, pathways, and bioaccumulation of heavy metals; to describe seasonal circulation patterns in the oil field; to determine the specific pollutants, their quantity and effects on the various components of the marine ecosystem; to determine levels, pathways, and bioaccumulation of selected discharge constituents (non-metals) in the marine ecosystem in the oil field; and to construct a hydrocarbon model.

PB80-107915 PC **A07**/MF **A01**
Geological Survey, Harrisburg, PA. Water Resources Div.
Selected Water Resources Data, Clarion River and Redbank Creek Basins, Northwestern Pennsylvania - Part 2.
Water resources investigations (Final),
Theodore F. Buckwalter, Clifford H. Dodge, and George R. Schiner. Jul 79, 143p USGS/WRI-79/19, USGS/WRD/WRI-79/088
Prepared in cooperation with Pennsylvania Dept. of Environmental Resources, Harrisburg.

This report presents selected basic data collected during a study of the water resources of the Clarion River and Redbank Creek basins in northwestern Pennsylvania. Hydrologic information including data on aquifers, water levels, and yields is presented for 1,304 wells. Records for 51 springs are also given. The report contains 83 chemical analyses of water samples collected from 30 stream sites and 300 analyses of water from 196 wells and 43 springs. Also included are 103 trace-element analyses. Monthly and annual means of groundwater levels for six observation wells are tabulated. Benthic invertebrate data from 136 stream sites are listed. Locations of data-collection sites are shown on 50 page-size reductions of 7-1/2 minute topographic quadrangle maps.

PB80-108079 PC **A06**/MF **A01**
RTKL Associates, Inc., Baltimore, MD.
A Pedestrian Planning Procedures Manual. Volume I: Overview.
Final rept. Jun 75-Nov 78,
L. S. Kagan, W. G. Scott, and U. P. Avin. Nov 78, 120p FHWA/RD-79/45
Contract DOT-FH-11-8816
See also Volume 2, PB80-108087. Prepared in cooperation with Kilkeary, Scott and Associates, Inc., Annapolis, MD.
Also available in set of 3 reports PC E17, PB80-108061.

The Manual identifies the significant data, procedures and criteria that should be considered in the planning and evaluation of both comprehensive pedestrian systems and individual facilities. This volume provides a general background and introduction to pedestrian planning and to the technical procedures of Volume II. The major topic areas covered in this volume include: (1) The pedestrian planning context; (2) The need for a pedestrian planning process; (3) Overview of the pedestrian planning process; and (4) Application of the pedestrian planning process.

PB80-108087 PC **A15**/MF **A01**
RTKL Associates, Inc., Baltimore, MD.
A Pedestrian Planning Procedures Manual. Volume II: Procedures.
Final rept. Jun 75-Nov 78,
L. S. Kagan, W. G. Scott, and U. P. Avin. Nov 78, 340p FHWA/RD-79/46
Contract DOT-FH-11-8816
See also Volume 1, PB80-108079 and Volume 3, PB80-108095. Prepared in cooperation with Kilkeary, Scott, and Associates, Inc., Annapolis, MD.
Also available in set of 3 reports PC E17, PB80-108061.

The Manual identifies the significant data, procedures and criteria that should be considered in the planning and evaluation of both comprehensive pedestrian systems and individual facilities. This volume is operational and sequential in nature. The procedures are grouped into two major phases: (1) A demand modelling phase, in which the existing (and projected) movement of pedestrians is examined using a gravity model approach to produce a network plan showing the assignment of pedestrian volumes; and (2) A network evaluation phase, in which first phase output is utilized to develop a plan addressing the specific planning of the pedestrian system elements and modal interface requirements. In addition, methods have been incorporated for examining and evaluating both system's effectiveness and potential impacts.

PB80-108095 PC **A17**/MF **A01**
RTKL Associates, Inc., Baltimore, MD.
A Pedestrian Planning Procedures Manual. Volume III: Technical Supplement.
Final rept. Jun 75-Nov 78,
L. S. Kagan, W. G. Scott, and U. P. Avin. Nov 78, 376p FHWA/RD-79/47
Contract DOT-FH-11-8816
See also Volume 2, PB80-108087.
Also available in set of 3 reports PC E17, PB80-108061.

The Manual identifies the significant data, procedures and criteria that should be considered in the planning and evaluation of both comprehensive pedestrian systems and individual facilities. This volume explains the derivation of the data provided in Volume II and presents considerably more detailed data and methodologies for various tasks as well as worked examples. This material is supplemental to Volume II and is to be used in conjunction with it. This volume also provides the user with a fundamental understanding of the research underlying the development of the Process, allows him to examine its assumptions, and modify data to suit his specific conditions.

PB80-108897 PC **A08**/MF **A01**
State Univ. of New York Coll. of Environmental Science and Forestry, Syracuse.
Survey of State and Local Officials: Phase I Results.
Interim rept.,
Douglas L. Heath, Andrew Huggins, James E. Stacey, Jr., and Ann S. Cooperberg. 20 May 77, 164p
Sponsored in part by New York State Health Research Council, Albany. A Product of the Audit of New York State's Comprehensive Public Water Supply and Sewerage Studies.

A New York State program resulted in the production, between 1962 and 1978, of 111 county-wide

comprehensive public water supply and sewerage reports. The reports were evaluated as to their actual use by state and local agency officials. Improvements in their use were suggested, particularly as regards keeping the reports current and in making future staff aware of their usefulness.

PB80-108905 PC **A06**/MF **A01**
State Univ. of New York Coll. of Environmental Science and Forestry, Syracuse.
Population Projections and Comprehensive Public Water Supply and Sewerage Studies. Executive Summary.
Interim rept.,
James E. Stacey, Jr. 1 Nov 77, 106p
Sponsored in part by New York State Health Research Council, Albany. A Product of the Audit of New York State's Comprehensive Public Water Supply and Sewerage Studies.Color illustrations reproduced in black and white.

In planning for sewerage and water supply facilities, population projection is one of the most important activities. This report is the result of an evaluation of the population projection methodologies and results of 111 comprehensive public water supply and sewerage studies, which resulted from a New York State program. Although the studies on the whole met the requirements of the law, major deficiencies were found in the projection of population growth and in the use of those projections. Suggestions are made for improving the process of population projection.

PB80-110299 PC **A20**/MF **A01**
Environmental Protection Agency, Washington, DC. Effluent Guidelines Div.
Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Mineral Mining and Processing Point Source Category.
Final rept.,
Douglas M. Costle, Thomas C. Jorling, Swep T. Davis, Robert B. Schaffer, and Ronald G. Kirby. Jul 79, 468p EPA/440/1-76/059B

This document presents the findings of an extensive study of the mineral mining and processing industry for the purpose of developing effluent limitations guidelines for existing point sources and standards of performance and pretreatment standards for new sources. to implement Sections 301, 304, 306 and 307 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1551, 1314, and 1316, 86 Stat. 816 et. seq.) (the 'Act'). Effluent limitations set forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available (BPCTCA) and the degree of effluent reduction attainable through the application of the best available technology economically achievable (BATEA) which must be achieved by existing point sources by July 1, 1977 and July 1, 1983, respectively. The standards of performance (NSPS) and pretreatment standards for new sources set forth the degree of effluent reduction which are achievable through the application of the best available demonstrated control technology, processes, operating methods, or other alternatives. Supporting data and rationale for development of the effluent limitations guidelines and standards of performance are contained in this report.

PB80-111891 PC **A04**/MF **A01**
Purdue Univ. Lafayette, IN. Water Resources Research Center.
Household Demand for Water and Policies to Encourage Conservation.
Technical rept.,
Rodney L. Clouser, and William L. Miller. Aug 79, 73p TR-124, W80-01203
Prepared by Purdue Univ., Lafayette, IN. Dept. of Agricultural Economics.

When a domestic water shortage occurs, the alternative usually investigated is increasing the supply, rather than decreasing the household demand. The authors studied two rural Indiana communities who were experiencing a water supply problem to determine the alternatives. People in general were not aware of available water saving devices for the home, and felt that water intensive appliances, such as dishwashers, automatic washing machines, etc., should be included in their present standard of living. The authors estimated that in a community of 600-1000 population, decreasing the demand for water by employing water saving kits would decrease the pumpage for the community by about 7.4 million gallons per year. The saving in water bills per household would range from $40-$60 annually or approximately $22,000 for the community. Other means of controlling demand considered are taxation, regulation, and pricing.

PB80-112162 PC **A06**/MF **A01**
Science Applications, Inc., Pleasanton, CA.
Systematic Sensitivity Analysis of Air Quality Simulation Models.
Final rept. Jan-Dec 78,
Robert J. Gelinas, and J. Peter Vajk. May 79, 107p EPA/600/4-79/035
Contract EPA-68-02-2942

This report reviews and assesses systematic sensitivity and uncertainty analysis methods for applications to air quality simulation models. The discussion of the candidate methods presents their basic variables, mathematical foundations, user motivations and preferences, computer implementation properties, and costs (including both human and computer resources). Both deterministic and sampling methods have been evaluated. Deterministic methods include the time- and user-honored method of arbitrary parameter adjustments by trial and error, variational methods, and a newly formulated Green's function method (for kinetics systems only). Sampling methods include Monte Carlo sampling of the outputs of air quality models to compute variances and a Fourier analysis method of sampling model outputs to compute expectation values of sensitivity coefficients.

PB80-112923 PC **A02**
Massachusetts Inst. of Tech., Cambridge. Sea Grant Coll. Program.
Low-Cost Shoreline Protection in Massachusetts.
Andrew L. Gutman. 1979, 17p MITSG-79-19J, NOAA-79100509
Grant NOAA-04-7-150-44079
Pub. in Proc. Specialty Conference on Coastal Structures 79, ASCE, held in Alexandria, VA on March 14-16, 1979.

Sand-filled fabric bags have been used successfully for low-cost, temporary shoreline protection in many areas of the country. The effective application of these bags was investigated at several sites in Massachusetts. A temporary groin was constructed for investigations prior to a planned large-scale beach nourishment program. The bags were also used as toe protection at a bulkhead and as a low-cost revetment. Finally, there was an extensive investigation of the 'perched beach' concept using bags as sills.

PB80-114721 PC **A07**/MF **A01**
Purdue Univ., Lafayette, IN. Water Resources Research Center.
A Comparative Application of Several Methods for the Design of Storm Sewers.
Technical rept.,
Christopher B. Burke, and Donald D. Gray. Aug 79, 141p TR-118, W80-01253, OWRT-A-051-IND(1)
Also pub. as OWRT-C-6106(5213)(12). Report on Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities.

Four methods which may be employed in the design and analysis of urban drainage systems were investigated: the National method, the Illinois Urban Drainage Area Simulator (ILLUDAS), the Soil Conservation Curve Number Method (CN) and the instantaneous unit hydrograph of Sarma, Delleur, and Rao (SDR). These methods were applied to two subdivisions: Fair Oaks Estates located in Carol Stream, Illinois, and Bar Berry Heights in West Lafayette, Indiana. Recommendations for the most effective use of each method are presented.

PB80-801020 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Urban Sewage Treatment Planning. Volume 2. 1976-September, 1978 (A Bibliography with Abstracts).
Rept. for 1976-Sep 78,
Robena J. Brown. Nov 79, 245p
See also Volume 1, 1970-1975, NTIS/PS-77/0887.

The citations cover sewage treatment studies which would be of general interest in urban management and includes studies on treatment costs, planning, operations, alternatives, and rates. Reports which discuss current and new processes in a general manner are also included. (This updated bibliography contains 236 abstracts, none of which are new entries to the previous edition.)

PB80-801038 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Urban Sewage Treatment Planning. Volume 3. October, 1978-November, 1979 (A Bibliography with Abstracts).
Rept. for Oct 78-Nov 79,
Robena J. Brown. Nov 79, 65p
Supersedes NTIS/PS-78/1039, NTIS/PS-77/0888, NTIS/PS-76/0773, NTIS/PS-75/596, and NTIS/PS-74/107. See also Volume 1, 1970-1975, NTIS/PS-77/0887 and Volume 2, 1976-September, 1978, PB80-801020.

The citations cover sewage treatment studies which would be of general interest in urban management and includes studies on treatment costs, planning, operations, alternatives, and rates. Reports which discuss current and new processes in a general manner are also included. (This updated bibliography contains 57 abstracts, all of which are new entries to the previous edition.)

PB80-801202 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Beryllium Pollution (A Bibliography with Abstracts).
Rept. for 1964-Oct 79,
Robena J. Brown. Dec 79, 178p
Supersedes NTIS/PS-78/1128, NTIS/PS-77/1016, NTIS/PS-76/0921, NTIS/PS-75/772, and NTIS/PS-75/021.

The bibliography covers research on air and water pollution by beryllium. This includes sources; control; detection and analysis; toxic effects on plants, animals, humans; and air and water quality emissions. Environmental levels of radioactive and radiation--produced beryllium are excluded. (This updated bibliography contains 172 abstracts, 16 of which are new entries to the previous edition.)

PB80-801228 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Shipboard Sewage Treatment (A Bibliography with Abstracts).
Rept. for 1964-Oct 79,
Robena J. Brown. Dec 79, 111p
Supersedes NTIS/PS-78/1125, NTIS/PS-77/1015, NTIS/PS-76/0905, and NTIS/PS-75/788.

The bibliography includes research for new and effective designs of shipborne sewage treatment systems. The principal treatment methods are by chlorination, aeration, biological treatment, incineration, Chemical removal, and activated carbon. Shipboard incinerators and sea disposal are also covered. (This updated bibliography contains 105 abstracts, 19 of which are new entries to the previous edition.)

PB80-801236 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Land Use in Urban Areas. Volume 2. September, 1975-October, 1979 (A Bibliography with Abstracts).
Rept. for Sep 75-Oct 79,
Edith Kenton. Dec 79, 275p
Supersedes NTIS/PS-78/1117, NTIS/PS-77/0928, NTIS/PS-76/0765, and NTIS/PS-75/656. See also Volume 1, 1964-August, 1975, NTIS/PS-76/0764.

Research reports are cited on various aspects of urban land use including transportation planning, water resource management, air pollution, and land use zoning. Excludes local studies. (This updated bibliography contains 271 abstracts, 59 of which are new entries to the previous edition.)

PB80-801319 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Water Pollution in Estuaries and Coastal Zones. Volume 2. 1975-October, 1978 (A Bibliography with Abstracts).
Rept. for 1964-Oct 78,
Robena J. Brown. Dec 79, 258p
See also Volume 1, 1964-1974, NTIS/PS-76/0851.

The bibliography contains selected abstracts of research reports covering studies dealing with water pollution from estuarine and coastal development, the effects of this pollution, and its control. The reports are general in nature so as to be of interest to any coastal area. The topics include pollution as related to urbanization, government actions, coastal planning, natural resource development, and sewage and solid waste disposal. Specific biological and oceanographic studies have been excluded. (This updated bibliography contains 252 abstracts, none of which are new entries to the previous edition.)

PB80-801327 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Water Pollution in Estuaries and Coastal Zones. Volume 3. 1978-October, 1979 (A Bibliography with Abstracts).
Rept. for 1978-Oct 79,
Robena J. Brown. Dec 79, 76p
Supersedes NTIS/PS-78/1176, NTIS/PS-77/0840, NTIS/PS-76/0852, NTIS/PS-75/698, and NTIS/PS-74/100. See also Volume 1, 1964-1974, NTIS/PS-76/0851 and Volume 2, 1975-October, 1978, PB80-801319.

The bibliography contains selected abstracts of research reports covering studies dealing with water pollution from estuarine and coastal development, the effects of this pollution, and its control. The reports are general in nature so as to be of interest to any coastal area. The topics include pollution as related to urbanization, government actions, coastal planning, natural resource development, and sewage and solid waste disposal. Specific biological and oceanographic studies have been excluded. (This updated bibliography contains 70 abstracts, all of which are new entries to the previous edition.)

PB80-801384 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Oil Pollution Detection and Sensing. Volume 2. 1976-November, 1979 (A Bibliography with Abstracts).
Rept. for 1976-Nov 79,
Edward J. Lehmann. Dec 79, 157p
Supersedes NTIS/PS-78/1076, NTIS/PS-77/0934, NTIS/PS-76/0701, and NTIS/PS-75/595. See also Volume 1, 1964-1975, NTIS/PS-77/0933.

Citations of research on sampling, detection, and chemical analysis of oil in water are presented. Studies on remote sensing principally using radar, ocean wave damping, and infrared detection are included. The classification, pattern recognition, luminescence, gas chromatography, and neutron activation analysis of oils are reported in these abstracts. The majority of these citations concern oil spills, but studies on oil wastes, industrial wastes, bilge water, and sewage are also covered. (This updated bibliography contains 152 abstracts, 17 of which are new entries to the previous edition.)

PB80-801459 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Sewage Treatment Costs and Economics (A Bibliography with Abstracts).
Rept. for 1970-Nov 79,
Diane M. Cavagnaro. Dec 79, 263p
Supersedes NTIS/PS-78/1174 and NTIS/PS-77/1010.

The cited reports of Federally-funded research discuss the costs and economics of sewage treatment systems, sewers, treatment technology, effluent discharge, and sludge disposal. Most studies cover the overall construction and operation costs of sewage treatment plants, whereas others include rate structures, financing, user charges, and benefits of regionalized plants. (This updated bibliography contains 256 abstracts, 82 of which are new entries to the previous edition.)

PB80-801475 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Acid Mine Drainage (A Bibliography with Abstracts).
Rept. for 1964-Sep 79,
Robena J. Brown. Dec 79, 279p
Supersedes NTIS/PS-78/1067, NTIS/PS-77/0949, NTIS/PS-76/0816, NTIS/PS-75/714, and NTIS/PS-75/046.

The bibliography on acid mine drainage cites studies primarily concerning control and treatment methods. Reports on hydrogeology, ecology, formation, and sources are included. (This updated bibliography contains 300 abstracts, 30 of which are new entries to the previous edition.)

PB80-801921 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Sulfate Emissions from Automobiles (Citations from the Engineering Index Data Base).
Rept. for 1964-Nov 79,
Diane Cavagnaro. Dec 79, 8p
Supersedes NTIS/PS-78/1235 and NTIS/PS-77/1050.

The cited reports from a worldwide literature survey relates to sulfate exhaust emissions from automobiles. The topics cover the chemistry, the relationship of sulfur oxides and sulfates, control equipment design and effectiveness, and the environmental impacts. (This updated bibliography contains 83 abstracts, 16 of which are new entries to the previous edition.)

PB80-801970 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Wind Effects. Part 2. General Structures (Citations from the NTIS Data Base).
Rept. for 1964-Nov 79,
Guy E. Habercom, Jr. Dec 79, 136p
Supersedes NTIS/PS-78/1208, NTIS/PS-77/1064, NTIS/PS-76/0950, and NTIS/PS-75/871. For the companion Published Search of the Engineering Index Data Base, see PB80-801996.

The effects of wind forces on structural domes, cylinders, ships, towers, antennas, and highway signs are cited in these Government-sponsored research reports. (This updated bibliography contains 129 abstracts, 11 of which are new entries to the previous edition.)

PB80-801996 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Wind Effects. Part 2. General Structures (Citations from the Engineering Index Data Base).
Rept. for 1970-Nov 79,
Guy E. Habercom, Jr. Dec 79, 290p
Supersedes NTIS/PS-78/1210, NTIS/PS-77/1066, and NTIS/PS-76/0952. For the companion Published Searches of the NTIS Data Base, see PB80-801970.

Structural domes and shells, cables and electrical wires, chimneys, cooling towers, storage tanks, and antennas exposed to wind pressure are investigated in these reports gathered from a worldwide literature survey. (This updated bibliography contains 285 abstracts, 29 of which are new entries to the previous edition.)

PB80-923200 Subscription
National Technical Information Service, Springfield, VA.
EPA Bibliographic Data File.
Quarterly repts.
1979, mag tapes
Supersedes NTISUB/E/232.
Source tape is in COSATI character set. Character set restricts preparation to 9 track one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products if you have questions. Available on subscription, North American Continent price $500.00/year; single copy price $175.00; all others write for quote.

The data file contains citations, with abstracts, for all U.S. Environmental Protection Agency's reports entered into the NTIS collection for 1978.

RLO-2229/T15-2 PC **A14**/MF **A01**
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
Comprehensive Bibliography and Index of Environmental Information Along the Three Alternative Gas Pipeline Routes.
E. H. Buck, A. Allen, R. B. Olshansky, and S. H. Pennell. Apr 78, 325p
Contract EY-76-S-06-2229-015

The bibliography was compiled to provide increased access to environmental information pertinent to the three alternative natural gas pipeline routes from Prudhoe Bay through Alaska. Only the Alaskan segment of each of these routes was included. 754 citations were included which discussed environmental features within 15 miles of any segment of any of the three pipeline routes. The indexes cover author, geographic location, earth sciences, taxonomic, and keyword. (ERA citation 04:051125)

SERI/TP-53-114R PC **A02**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Review of the Environmental Effects and Benefits of Selected Solar Energy Technologies.
K. A. Lawrence. May 79, 18p
Contract EG-77-C-01-4042

Data are reviewed and summarized on the environmental effects of three solar energy technologies: photovoltaic cells, wind energy conversion (WEC), and the solar thermal central receiver. Potential effects are identified for each of the life cycle phases: resource extraction and component manufacture, plant construction, operation and decommission. The solar energy technologies are assumed to be deployed as centralized energy production facilities. The technologies examined are materials intensive compared to fossil fuel plants with the same power rating. As a result, the life-cycle phase of resource extraction and component production is the most environmentally hazardous. Impacts of plant construction will be somewhat site specific but should approximate impacts associated with any large construction activity. The operation phase is relatively environmentally benign. WEC operation does produce low-level noise pollution and presents minimal hazards to flying species. Solar thermal facilities equipped with wet cooling towers may affect local air quality via cooling tower drift. In addition, large installations of each option may alter local microclimate. Decommission of WEC, solar thermal, and Si-photovoltaic facilities should present no environmental hazards, although disposal of CdS or GaAs cells will require care. (ERA citation 04:051227)

TID-29305 PC **A02**/MF **A01**
Minnick (L.J.), Inc., Plymouth Meeting, PA.
Development of Potential Uses for the Residue from Fluidized Bed Combustion Processes. Quarterly Technical Progress Report, September--November 1978.
L. J. Minnick. 1978, 24p
Contract EF-77-C-01-2549

Results of x-ray diffraction analysis of an AFB residue sample from Combustion Engineering in Windsor, Connecticut reveals the presence of a high percentage of calcium carbonate in this source of spent bed residue. The particle size distribution of this material is identical to that of a spent bed residue sample from Alliance, Ohio. Initial evaluation of lime separation of AFB residue from Alliance, Ohio by means of a soil elutriator indicate limited value for this technique as a sole means of lime extraction; however, the elutriation system may be useful when employed in conjunction with other beneficiation techniques. Use of an x-ray hydration procedure is seen as an efficient means of identifying basic differences in the rate of hydration of different AFB residue sources. The results of a study of dimensional stability of cylindrical stabilized base specimens containing AFB residue indicate clearly that the majority of the volume expansion noted in the specimens occurs during initial curing within a 7 day period following the molding of the specimen. Early 7 day strength results from a comprehensive road base mix design study have indi-

cated that excellent strength can be established in a number of formulae which were considered for a road demonstration. The experience gained from a recent field demonstration project in eastern Ohio proves that, with proper moisture control, stabilized road base compositions containing varying amounts of AFB residue can be successfully blended and placed in the field using conventional mixing, spreading, and compaction equipment. A recently completed demonstration of the use of AFB residue as a sorbent medium in a flue gas desulfurization system at Southern Illinois University has shown that the system operated with AFB residue in much the same manner as with commercial hydrated lime. (ERA citation 04:051877)

13C. Construction Equipment Materials, and Supplies

AD-A075 064/6 PC **A04**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Ms
Selected Bibliography on Fiber-Reinforced Cement and Concrete. Supplement Number 2.
Final rept.,
George C. Hoff. Jul 79, 61p WES-MP-C-76-6-SUPPL-2, CTIAC-39
Supplement no. 2 to report dated Aug 76, AD-A032 082. See also Supplement no. 1, AD-A044 433.

A listing of 471 additional references with author index is given for fiber-reinforced cement and gypsum matrices, mortars, and concretes. Fiber types include steel, glass, plastic, asbestos, organic, carbon, and others. (Author)

AD-A075 359/0 PC **A11**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Ms
Investigation of Performance of Concrete and Concreting Materials Exposed to Natural Weathering. Volume 1. Active Investigations. Revision.
Technical rept.
Aug 77, 236p Rept no. WES-TR-6-553-VOL-1-REV
Revision of report dated Jun 60. See also Volume 2, AD-A075 360.

The ultimate test of the durability of concrete is its performance under the exposure conditions in which it is to serve. Although laboratory tests yield valuable indications of probable durability, the potential disrupting influences in nature are so numerous and variable that actual field exposures are highly desirable to assess the durability of concrete when exposed to natural weathering. To this end, exposure stations have been provided at several locations in the United States. (Author)

AD-A075 360/8 PC **A08**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Ms
Investigation of Performance of Concrete and Concreting Materials Exposed to Natural Weathering. Volume 2. Completed Investigations. Revision.
Technical rept.
Jan 73, 161p Rept no. WES-TR-6-553-VOL-2-REV
Revision of report dated Jun 61. See also Volume 1, AD-A075 359.

Completed investigational programs are summerized in tabulation. The remainder of the report is devoted to a discussion of these programs and specific findings of each together with a presentation of the exposure records of the test specimens involved.

PB80-105703 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
The Strength of Clay Subgrades: Its Measurement by a Penetrometer,
W. P. M. Black. c1979, 17p TRRL-LR-901
Also pub. as ISSN-0305-1293.

Improved methods of pavement design require that soil strength should be characterised in terms of fundamental parameters. Although the strength parameter CBR widely used in present methods of road design is empirical in origin, it is shown that it can be related to the undrained shear strength of cohesive soils by one of two linear relationships, one characterizing soils in an undisturbed overconsolidated state and the other soils that are remolded. After validating these relationships it is shown that a penetrometer with a small-diameter cone that is capable of measuring the shear strength of a soil can be used to estimate its CBR. The penetrometer can then be used to characterize soil strength in terms of either shear strength or CBR. (Copyright (c) Crown Copyright 1979.)

PB80-105745 PC **A05**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Mixing and Laying Trials of Bituminous Materials Produced by the Wibau-SL Process,
I. H. Czarnecki, and G. D. Goodsall. c1979, 83p TRRL-LR-897

The Wibau-SL process was developed as a means of producing bituminous materials more economically than by conventional processes; this is achieved because the process does not require elaborate dust-suppression equipment and, as a consequence, operating costs are lower. This report describes mixing and laying trials of bituminous materials produced by the Wibau-SL process. The aggregates used in the trials included limestone, basalts, gravels, slag and natural sands and the binders were petroleum bitumens and pitch-bitumens of penetration grades. The materials successfully produced included rolled asphalt wearing courses and basecourses, dense roadbase and wearing course macadams, open-textured macadams and fine cold asphalt. (Copyright (c) Crown Copyright 1979.)

PB80-105752 PC **A03**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
The Strength of Clay Fill Subgrades: Its Prediction in Relation to Road Performance,
W. P. M. Black, and N. W. Lister. c1979, 35p TRRL-LR-889

The suction method for estimating the shear strength of soils from plasticity data and moisture content has been examined in the light of a wide range of experimental evidence; it is concluded that the method predicts changes in strength of a wide range of soils satisfactorily. The method has been used to quantify the likely changes in moisture content and strength under a range of site conditions. Very wet weather during construction on a poorly drained site reduces markedly the ultimate equilibrium strength of subgrades of low plasticity; equilibrium values are less than half the values associated with construction in dry weather. Heavy clays are much less affected. Deflection studies indicate that the life of a pavement built in very wet weather may be reduced by up to 50 per cent of the life expected of a pavement constructed during average weather conditions. (Copyright (c) Crown Copyright 1979.)

PB80-105778 PC **A04**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
The Distribution of Aggregates-Results of Computer Modelling Studies,
M. H. Glover, and B. A. Shane. c1979, 58p TRRL-LR-898

The report describes a study of the production and distribution of aggregates in Great Britain, in which the activities of producing, transporting, and using aggregates are regarded as flows in the links of a network. The out-of-kilter algorithm is used to calculate the flow pattern which satisfies the demand for aggregates at least cost. The study considers the effects of rail depot density, rail capacity, the supply of sea-borne materials from coastal quarries and, to a limited extent, the effects of some non-market costs on the transport of aggregates. Conclusions are drawn concering the total costs of the distribution system, the planning of rail receiving depots for aggregates, the effects of any reduction in the capacity of the rail system to transport aggregates and the likely market for sea-borne materials. (Copyright (c) Crown Copyright 1979.)

13E. Couplings, Fittings, Fasteners, and Joints

AD-A075 249/3 PC **A10**/MF **A01**
Naval Postgraduate School Monterey Ca
A Comparison of Fillet Weld Strength and U.S. Navy Design Specifications for Non-Combatant Ships and the Economic Implications.
Master's thesis,
William Carl McCabe. May 78, 207p

There is a great interest in the strength of fillet welds because the welding operation accounts for about 30% of the labor cost in planning and constructing ship hulls. One way to reduce welding cost is to reduce the required weld size. Background information is obtained by reviewing the major experimental and theoretical work in the areas of static strength, fatigues strength, and shear strength of fillet welds. In order to appreciate the conditions in the real world, design considerations, fabrication considerations, and corrosion considerations are discussed. Typical joints from existing U.S. Navy ships are employed to obtain detailed geometry and local loading information to be used as input for a computer model which was developed at Massachusetts Institute of Technology which uses the finite element method for determining the static strength for fillet welds. In one particular joint a reduction of 30% in the required weld size is justified. A future system for analyzing fillet weld strength is proposed and explained by the use of an example. The economics of intermittent and continuous welds are examined, and the economic impact that a reduction in the required fillet weld size would have on ship construction cost is estimated. (Author)

AD-A075 541/3 PC **A06**/MF **A01**
Materials Research Lab Inc Glenwood Ill
Fracturing Characteristics of Adhesive Joints.
Final rept. 1 Feb 77-15 Sep 78,
Sheldon Mostovoy , and E. J. Ripling. 15 Sep 78, 124p
Contract N00019-77-C-0256

Test methods were developed by MRL for evaluating the fracture mechanics parameters of adhesive joints. These tests, were designed for measuring crack resistance under Mode I, combined Mode I and II, and combined Mode I and and III loading. All of the tests can be applied to monotonically increasing loads, static loads in an environment, i.e., stress corrosion cracking, or to crack growth rate under fatigue loading. There does not appear to be a general 'law' for describing the effect of adding some shear (Mode II or III) onto opening mode loads; rather, the difference between pure and mixed mode loading depends on the load-time profile. Hence, mixed-mode loading must be treated differently for each type of loading. A section on bond manufacturing and testing details compares the phosphoric acid anodizing (PAA) aluminum adherend treatment to the chromic acid etch (FPL) on the basis of resistance to stress corrosion cracking in the wedge test. Application of linear elastic fracture mechanics to the prediction of structural life based on the use of finite element as well as an energy analysis are also discussed.

N79-32350/7 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
Effect of an Anti-Corrosion Penetrant on the Fatigue Life of Various Riveted Joints During Flight Simulation Tests.
J. Schijve, F. A. Jacobs, and P. J. Tromp. 15 Jan 79, 33p NLR-TR-77103-U
Contract NIVR-1725

Comparative flight simulation tests on four types of joints of 2024-T3 sheet material were carried out with and without application of the penetrant LPS-3. Types of joints tested were double strap joints with hi-lok bolts, asymmetric strap joints, lap joints with countersunk rivets, and lap joints with dimpled holes. Observations on slip during the fatigue tests as well as during static tests to failure were made. A reduction in fatigue life was observed in asymmetric strap joints and simple lap joints, but no reduction was found for the other types of joints tested. The effect depends on the design of the joint, while the maximum load during the test may also be significant in view of the occurrence of slip.

N79-32574/2 PC **A06**/MF **A01**
Delaware Univ., Newark. Center for Composite Materials.
Behavior of Composite Bolted Joints at Elevated Temperature.
D. W. Wilson, and R. B. Pipes. Sep 79, 108p NASA-CR-159137, CCM-1-78
Grant NSG-1409

Experimental results from an investigation which examines the combined effects of temperature, joint geometry and out-of-plane constraint upon the response of mechanically fastened composite joints are presented. Data are presented for simulated mechanically fastened joint conditions in two laminate configurations fabricated from Hercules AS/3501-6 graphite-epoxy. Strength and failure mode results are presented for the test temperatures of 21 C, 121 C and 177 C and for a range of the geometric parameters W/D and e/D from 3.71 to 7.43 and 1.85 to 3.69, respectively. A hole diameter, D of 5.16 mm was utilized for all tests. Pin bearing tests with out-of-plane constraint were conducted at room temperature only. All elevated temperature data were generated for pin bearing conditions. Ultrasonic C scan inspection of the failed specimens was employed to assess the damage region and to determine failure mode. Comparative data are presented for pin bearing and out-of-plane constraint conditions for the above mentioned joint configurations. The joint under pin loading was modeled by two dimensional finite element methods. Predicted net section strain concentrations were compared with experimental results.

N79-32575/9 PC **A02**/MF **A01**
Old Dominion Univ. Research Foundation, Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
Photoelastic Studies of Advanced Lap Joint Concept.
Final Report, 15 Mar. 1978 - 30 Sep. 1979.
R. Prabhakaran. Oct 79, 10p NASA-CR-162316
Grant NSG-1507

Photoelasticity was introduced as a quantitative tool in the experimental stress analysis of anisotropic birefringent composite model materials. The investigation was divided into three parts: (1) separation of principal stresses or strains, (2) photoelastic calibration, and (3) development of model-prototype relations.

PB80-106073 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
High Strength Friction Grip Bolted Joints-Effects After One Year of Weathering Under Load,
D. S. Moss. c1979, 25p TRRL-SUPPLEMENTARY-499

The first year of a five year study of the behavior of high strength friction grip bolted joints under the combined action of continuous loading and weathering is reported. The plies of specimen joints were given various surface treatments and were weathered before assembly. Some joints were tested for slip factor and the results compared with those of tests on joints having unweathered plies. Similar joints are now weathering under continuous loading, and slip is being monitored. The slip factors of unprotected joints, particularly those made from weathering steel, were increased by pre-assembly weathering, but were reduced for joints having corrosion resistant treatments. Slip has occurred in most of the loaded joints and the largest movements have taken place in the joints having corrosion resistant treatments containing zinc. It is concluded that, when some corrosion resistant treatments are used on the interfaces of high strength friction grip bolted joints, the efficiency of the joint is impaired if the surfaces weather before assembly. It is recommended that, when these treatments are used, the interfaces should be protected to prevent weathering in the time between preparation of the surfaces and assembly of the joint. (Copyright (c) Crown Copyright 1979.)

13F. Ground Transportation Equipment

PAT-APPL-6-090 744 PC **A02**/MF **A01**
Office of the Secretary of Transportation, Washington, DC.
Longitudinal Rail Profilometer.
Patent Application,
Lennart E. Long, Roger K. Steele, David F. Coleman, and Ralph A. Gustafson. Filed 2 Nov 79, 13p PB80-114879, DOT-TSC-10130
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The patent application describes a portable apparatus for use in measuring vertical deviation of the surface of a rail from a reference plane. The measuring device includes a pair of guide beams and a hand-powered carriage which move along the beams. A sensor, which follows undulations resulting from rail wear, is mounted on the carriage and is coupled to the pen of a recorder.

PB80-105802 PC **A02**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
Power Requirements of Articulated Vehicles under Cornering Conditions,
L. Gyenes, T. Williams, and I. C. P. Simmons. c1979, 23p TRRL-SUPPLEMENTARY-484

Experimental and theoretical investigations have shown that to overcome the forces induced as a vehicle turns a sharp corner the power output from the engine must be increased considerably. Steady state power when cornering can be predicted by a simple summation of the work done by the tractive effort in overcoming the rolling resistance, the centrifugal forces and the bogie slewing moments at each group of axles. Fixed axles with no articulation are the prime cause of the increase in power. Slip angles were calculated and tire wear assessed at the various axles of an articulated vehicle. For long haul operation the effect of cornering will not account for more than about 3 per cent of the total fuel consumption. (Copyright (c) Crown Copyright 1979.)

PB80-106560 PC **A04**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
An Evaluation of Anti-Burst Door Latches for Cars,
P. L. Read, D. K. Griffiths, P. F. Gloyns, and R. W. Lowne. c1979, 57p TRRL-SUPPLEMENTARY-490
Prepared in cooperation with Birmingham Univ. (England)., and Cranfield Inst. of Tech. (England).

This report describes the performance of door latches in accidents and in laboratory tests. It results from cooperation between the Accident Research Unit of the University of Birmingham who studied the accident data, the School of Automotive Studies of the Cranfield Institute of Technology who carried out the testing and the Transport and Road Research Laboratory who contributed to the analysis. The incidence of car door openings during accidents is outlined and latch types are ranked according to their observed performance in accidents. All the anti-burst latches discussed satisfy ECE Regulation 11 which is currently required. It tests latches as separate entities without any of the vehicle and door structures to which they are attached. The development of a procedure to test latches when mounted in vehicle structures is described. This test was performed on a range of vehicles corresponding with those studied in the accident survey. The performance rankings from these tests are compared with the accident survey ranking and a good correlation is shown. The results of a set of ECE 11 tests are shown for comparison. An analysis combining the accident survey and laboratory test data allows an estimate to be made of the effect on door opening rates in accidents if a vehicle bodyshell latch test were to be instigated. (Copyright (c) Crown Copyright 1979.)

PB80-111834 PC **A09**/MF **A01**
National Highway Traffic Safety Administration, Washington, DC. Technical Services Div.
Passive Restraints.
Subject bibliography,
Lois Flynn. Sep 79, 190p DOT-HS-805 044, SB-37
See also report dated Feb 78, PB-278 563.

The bibliography represents literature acquired since the establishment of the National Highway Traffic Safety Administration (NHTSA) concerning the development and use of passive restraints in motor vehicles. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal Highway Safety Literature and are indexed by a key-word-out-of-context (KWOC) listing, author, corporate author, contract number, and report number.

PB80-114044 PC **A02**/MF **A01**
Unified Industries, Inc., Alexandria, VA.
Wood Tie Reuse: A Survey Report.
Final rept. Jul 78-Aug 79,
G. Richard Cataldi, David N. Elkaim, Kenneth W. Larsen, and Paul Elliott. Aug 79, 25p UII-92104-2, FRA/ORD-79/44
Contract DOT-FR-8046

This report presents a survey of wood tie reuse associated with track renewal in North America and Europe. Topics covered include the causes of tie deterioration, the technology of tie repair, and a survey of wood tie reuse practices in France, Italy, West Germany, Great Britain, the U.S.S.R., and the United States. Also included is a discussion of the economics of wood tie reuse, consisting principally of reviews of the wood tie reuse aspects of two recent U.S. studies. One study focused on the potential of track renewal as an alternative to selective maintenance and the other study examined the technical and economic feasibility of using repaired ties in lieu of new ties when replacing defective ties. Although these studies are neither wholly comparable nor comprehensive, they do provide perspective on the potential costs and benefits of wood tie reuse. All in all, based on these studies and other information, it appears that the economics of tie reuse is promising and that used ties have a potential role to play in track maintenance in North America. The report concludes with a brief examination of several major issues of wood tie reuse economics that require further study.

UCRL-52758 PC **A03**/MF **A01**
McAlvey (Robert F.), III and Associates, Hobken, NJ.
Impact of Flywheel-Transmissions on Automobile Performance: A Logical Basis for Evaluation.
R. F. McAlevy, III. 9 Apr 79, 33p
Contract W-7405-ENG-48

The study deals with the application of flywheel-transmissions to electric vehicles and to petroleum-fueled automobiles. In contrast with previous work in this area, which was based on a variety of computer models of automotive vehicles, an analytical approach was taken. The intention was to evolve simple algebraic equations that describe an automobile's total (laden) mass and energy economy as a function of mission requirements (i.e., payload, range, and drive-cycle acceleration demand). Equations are given that can be used to evaluate the impact of a flywheel-transmission on an automobile's mass and energy economy. (ERA citation 04:051890)

13H. Industrial Processes

AD-A075 161/0 PC **A03**/MF **A01**
Harry Diamond Labs Adelphi Md
A Numerical Control Facility for Semiautomatic Wire-Wrapping and Verification.
Technical memo.,
Albert Lee , and Rosalie W. Hine. Aug 79, 45p
Rept no. HDL-TM-79-20

This report describes the procedures for processing information to be used by a paper-tape-controlled semiautomatic wire-wrap machine. details concerning computer start-up and wire-wrap machine setup are explained in separate instruction sets. The instructions are presented step by step, to minimize training time for inexperienced operators. A wire-wrap verification option is also described, which provides a means to perform quick, comprehensive checks of wire-wrap connections. (Author)

AD-A075 214/7 PC **A05**/MF **A01**
Naval Postgraduate School Monterey Ca

Underwater Welding in the Deep Sea.
Master's thesis,
David Paul Erickson. May 78, 94p

Underwater welding methods presently in use or under development are reviewed in order to determine which methods have possible application to deep sea use (depths greater than 1000 feet). Studies on one of the new methods under development (flux-shielded method) were carried out with the use of a hyperbaric chamber. A series of flux-shielded bead-on-plate welds were performed underwater up to simulated water depths of 680 feet. The quality of the welds was evaluated by examination of the macrostructure, microstructure and microhardness of the weld joint. The welds performed indicated the flux-shielded method may be suitable for underwater welding in the deep sea.

AD-A075 346/7 PC **A03**/MF **A01**
Army Industrial Base Engineering Activity Rock Island Il
Manufacturing Methods and Technology CAM Plan FY 1979-1981.
Final rept.,
James H. Sullivan. Aug 79, 46p

This report provides a summary of the Army's FY 79-81 Manufacturing Methods and Technology Program directed toward computer-aided manufacturing. The following information is provided for 61 projects. Project number, title, projected funding, a statement of the problem and proposed solution, and the technology area into which the project is categorized. The current status of FY 79 projects is also provided. (Author)

AD-A075 388/9 PC **A03**/MF **A01**
Honeywell Corporate Material Sciences Center Bloomington Mn
Effect of Workpiece Properties on Grinding Forces in Polycrystalline Ceramics.
Technical rept.,
B. G. Koepke , and R. J. Stokes. Jun 79, 41p
Rept nos. 47502, TR-7
Contract N00014-69-C-0123

Grinding forces have been measured on a number of polycrystalline ceramics and correlations between the forces and workpiece properties have been attempted in an effort to gain insight into mechanisms of chip formation. The closest correlations were with a parameter related to the indentation fracture characteristics of each workpiece. This suggest that a major mechanism of chip formation during multipoint abrasive machining of ceramics is fracture resulting from the plastic indentation of the workpiece by the abrasive grains. Grinding forces during up and down grinding were different but both correlated with the indentation fracture parameter when the comminution characteristics of the chips during down grinding were accounted for. (Author)

N79-32326/7 PC **A05**/MF **A01**
Pratt and Whitney Aircraft Group, West Palm Beach, Fla. Government Products Div.
Development of Sputtered Techniques for Thrust Chambers.
Final Report.
J. R. Mullaly, and P. A. Allard. Mar 79, 96p
NASA-CR-159637, FR-11409
Contract NAS3-20377

The 0.152 cm thick sputtered and copper deposits were electron beam welded to wrought copper. Tensile specimens were machined from the weld assemblies and tested at room temperature. Tensile strength approached the strength of wrought material. Elongations up to 25% were measured. Sputtered aluminum was used to fill 0.157 cm wide by 0.127 cm deep grooves in thrust chamber spool piece liners. The liners were closed out by sputtering copper from post and hollow cathodes.

N79-32556/9 PC **A05**/MF **A01**
Fraunhofer-Gesellschaft zuer Foerderung der Angewandten Forschung e.V., Bremen (Germany, F.R.). Inst. fuer Angewandte Materialforschung.
On the Welding of Martensitic Hardened Steels Erfahrungen Beim Schweissen Eines Martensitaushaertbaren Stahls.
S. Klingauf, and K. Seifert. 1978, 90p BMVG-FBWT-78-17
Subm-Sponsored by Bundemin. Der Verteidung. Language in German.

A good understanding of the weldability and weld characteristics of a high strength maraging steel X2 nickel-cobalt-molybdenum (HFX 750) was sought. Studies were performed on transformation and precipitation processes, and variations in the physical constants (yield point, tensile strength) of alloys with different titanium contents. Results obtained with various welding procedures (TIG, MIG, electron beam welding) are presented. The physical characteristics studied include strength, resistance, temperature fields, and cracking. Curves and metallographic photographs are given.

SAND-79-0524J PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Bibliography: Ion Plating and Related Ion Bombardment Effects.
D. M. Mattox. Jul 79, 26p
Contract EY-76-C-04-0789

A bibliography of references concerning ion plating and related ion bombardment effects is presented. The references are listed in the year of publication. (ERA citation 04:052118)

13I. Machinery and Tools

AD-A075 130/5 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
The Expansion of Technological Possibilities of Vertical Hydraulic Stamping Presses.
F. V. Tulyankin , L. Ye. Medvedev , V. A. Novoselov , and V. S. Qgurtsov. 29 May 79, 13p
Rept no. FTD-ID(RS)T-0713-79
Edited trans. of Tekhnologiya Legkikh Splavov (USSR) n2 p83-88 1970, by Robert D. Hill.

No abstract available.

AD-A075 339/2 PC **A02**/MF **A01**
Army Armament Research and Development Command Dover Nj Fire Control and Small Caliber Weapon Systems Lab
Established Fabrication Methods for Two- and Three-Wire Mesh Springs.
Final rept. Apr 77-May 79,
Henry P. Swieskowski. Aug 79, 20p ARSCD-TR-79010, AD-E400 350

Manufacturing procedures are established for the quantity production of two and three-wire mesh springs on production coilers. The mesh spring configuration is a comparatively new concept and is intended for impact loading applications. Necessary tooling and modifications to facilitate the coiling of mesh springs were determined and adapted to the coiler. In this project, the following two common spring materials were used: music wire QQ-W-470 and stainless steel QQ-W-423. A two-wire mesh spring and a three-wire mesh spring were designed to equivalent conditions of load, stress, and outside coil diameter, and prototype lots of these designs were fabricated. If the spring pitch equals 12.7mm or less, the mesh springs can be fabricated with good dimensional control. Also, if 1.5 to 2.0 coils are closed on each spring end, spring separation can be prevented. (Author)

N79-33475/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Traction Drive Performance Prediction for the Johnson and Tevaarwerk Traction Model.
J. L. Tevaarwerk. Oct 79, 41p NASA-TP-1530, E-033

The fluid rheology model is used to investigate the traction behavior for typical traction drive contacts. The aspect ratio of the contact and the invariably present spin are investigated. Contacts with a low aspect ratio predict a superior performance in that they show less slip for the same degree of traction. Spin always has a diminishing effect on the traction at the same slip. At sufficiently high spin the model may be simplified to a limiting shear stress model. The conventional rigid plastic analysis applies here equally well.

N79-33476/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Correlation of Asperity Contact-Time Fraction with Elastohydrodynamic Film Thickness in a 20-Millimeter-Bore Ball Bearing.
J. J. Coy. Oct 79, 21p NASA-TP-1547, AVRADCOM-TR-79-26

Elastohydrodynamic film thicknesses and asperity contact-time fractions were measured for a 20 mm bore ball bearing by using the capacitance and conductance techniques. The bearing was thrust loaded to 90, 445, and 778 N. The corresponding maximum stresses on the inner race were 1.26, 2.09, and 2.45 GPa. The test speed ranged from 400 to 15,000 rpm. The test bearing was mist lubricated with a MIL-L-23699A turbine oil. The temperature was 27 C. The experimental results were correlated to give the percent film (no-contact-time fraction) as a function of measured film thickness. Measurements were made for three test series that represented the test bearing in various conditions of run-in. The measurements show that the percent film changes with bearing run-in time. The experimental results agreed well with theoretical predictions based on surface trace analysis for a new bearing. For the run-in state, they agreed with previously reported experimental results. The results show that asperity contact existed at a film thickness-roughness ratio lambda of 6.0 or less for a new bearing. After run-in, no asperity contact occurred at a lambda of 3.5 or greater.

UCID-18230 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Failure Analysis of a Hastelloy C-276 Geothermal Injection Pump Shaft.
G. E. Tardiff, and E. O. Snell. 27 Jul 79, 7p
Contract W-7405-ENG-48

A metallurgical analysis of a fractured Hastelloy C-276 brine injection pump shaft was carried out to determine the cause of failure. Loss of load carrying cross section due to intergranular corrosion by molten bronze bearing alloy followed by torsional overload of the remaining section was the cause of failure. Lack of evidence for brine induced corrosion or stress corrosion of the Hastelloy C-276 alloy is consistent with prior successful experience with this material in contact with high temperature, high salinity Salton Sea Geothermal Field brines. (ERA citation 04:051390)

13J. Marine Engineering

AD-A075 101/6 PC **A17**/MF **A01**
Tetra Tech Inc Pasadena Calif
Mechanics of Underwater Noise.
Final rept.,
Donald Ross. 1976, 385p Rept no. TETRAT-SD-366-76-1
Contract N00014-74-C-0046

The basic mechanisms by which acoustic noise is generated, transmitted by structures, and radiated into the underwater environment are explained. Dominant mechanisms which have practical application are emphasized. (Author)

AD-A075 203/0 PC **A09**/MF **A01**
National Research Council Washington Dc Panel on Response To Casualties Involving Ship-Borne Hazardous Cargoes
Responding to Casualties of Ships Bearing Hazardous Cargoes.
1979, 180p
Contract N00014-77-C-0796

In recent years, there has been a sharp and continuing increase in the volume of hazardous cargo transported by water. Acknowledging the risks, manufacturers and shippers, along with federal and state governments, have made commendable efforts to prevent casualties that involve dangerous cargoes. However, this focus on prevention may have diverted attention from an equally important aspect of hazardous cargo safety: the need for prompt, orchestrated, and highly effective response to the casualties that can and do occur despite the most stringent precautions, with emphasis on developing the technical and institutional capabilities for this response. In the meanwhile, the technical community who would be called upon to cope with a casualty has expressed concern about the capability to respond to and manage a signifi-

cant marine incident involving hazardous cargoes. In reply to these concerns, the National Research Council's Marine Board undertook an assessment of current capability, both technical and institutional, for responding to casualties involving ships carrying hazardous cargoes. In February 1978, the Marine Board established a Panel on Response to Casualties Involving Ship-Borne Hazardous Cargoes to undertake the assessment. This report presents the results of that assessment. (Author)

AD-A075 223/8 PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Development of a Heavy Weather Operator Guidance Catalog for FF-1052 Class Ships.
Final rept.,
Susan L. Bales , and Edward W. Foley. Feb 79, 67p Rept no. DTNSRDC/SPD-0773-02

This report is the second in a series that considers the inclusion of seakeeping data in ship operations planning and decision making. It presents a condensed version of a Catalog of Heavy Weather Operator Guidance (HWOG) developed for FF-1052 Class ships. The Catalog provides the ship operator with hard copy, quantitative predictions as to how the ship responds in a seaway and some guidance for avoiding excessive ship motions or related events, such as slamming and wetness, that may cause damage to the ship during heavy weather conditions. The Catalog makes no attempt to tell the operator what to do, but rather describes, through seakeeping operator envelopes (SOE's), what he may expect under a set of arbitrary sea conditions. It is intended that the application of the provided data should be made with good judgement, the consideration of mission requirements, and the operator's firsthand interpretation of prevailing conditions. In addition to presenting a condensed version of the HWOG Catalog, this report also briefly describes the analytic procedures used and the assumptions made in the development of this Catalog, which, it should be noted, are the result of the cooperative efforts of the design, R&D, and operations communities.

AD-A075 252/7 PC **A05**/MF **A01**
Naval Postgraduate School Monterey Ca
The Influence of Platform-Conductor Gaps on the Dynamic Response of Offshore Platforms.
Master's thesis,
Lynn Frederick Powers. May 78, 91p

The prerequisite to a dynamic analysis of an ocean platform is an accurate baseline measurement of the fundamental flexular and torsional natural frequencies. As an element of this baseline, the author uses the Runga-Kutta numerical integration method to determine the influence of a non-linear structural element on the measurement of the fundamental flexural natural frequency of the system. The non-linear phenomena which was investigated was the collision between the vertical conductor pipes and their guide collars on the platform. The analysis proved that for large excitation loads the response is non-linear, but that there is an excitation level below which the non-linearity is negligible. (Author)

AD-A075 441/6 PC **A03**/MF **A01**
Army Command and General Staff Coll Fort Leavenworth Ks
An Analysis of the Future Effectiveness of the Sea Based Deterrent.
Research rept.,
John J. Kelly, Jr. May 79, 38p

Evaluates the deterrent capability of Trident submarine and analyzes capabilities against anti-submarine warfare. (Author)

AD-A075 457/2 PC **A07**/MF **A01**
Iowa Univ Iowa City Div of Educational Psychology
A Method for Economic Trade-Offs of Alternate Ship Structural Materials.
Final rept.,
C. R. Jordan , James B. Montgomery , R. P. Krumpen, Jr. , and D. J. Wooley. 30 Aug 78, 147p SSC-289
Contract N00024-77-C-5323
Report on Materials Trade-Off Study.

A method for evaluating the desirability of any proposed material in merchant ship structure has been developed. This method compares a ship designed of the new material with a similar steel ship. Comparison includes a life-cycle cost analysis and a quantified evaluation of non-economic factors. Formalized techniques for establishing the material data bank, selecting the steel ship design, developing and optimizing the new material design, and conducting the economic and non-economic comparisons are described. A sample calculation, using 5456 aluminum in a bulk ore carrier, is included to illustrate the method. (Author)

AD-A075 477/0 PC **A05**/MF **A01**
Hydronautics Inc Laurel Md
The Effects of Varying Ship Hull Proportions and Hull Materials on Hull Flexibility, Bending and Vibratory Stresses.
Final rept.,
Pin Yu Chang. Apr 79, 82p 7715-1, SSC-288
Contract DOT-CG-61906-A
See also Rept. no. SSC-249 dated Jun 74, AD-A008 388.

The effect of varying ship proportions and hull materials on hull flexibility and on the concomitant bending and vibratory stresses for an ore carrier, a tanker, containership, and a general cargo ship is evaluated. With the flexibility of the ship's hull represented by the natural frequency of the ship associated with the two-node shape, a potentially useful relation between the flexibility and bending moment has been established. An analysis indicates that forward speed affects hydrodynamic damping and forces as well as hull flexibility, and there may exist an optimal flexibility for every ship, but there is not necessarily a limit to the flexibility. (Author)

AD-A075 528/0 PC **A08**/MF **A01**
Naval Postgraduate School Monterey Ca
A Design Guide for Naval Ship Propulsion Plants.
Master's thesis,
William Robert Mitchell. Apr 78, 174p

A design guide for Naval Ship propulsion plants is developed and a sample problem is presented to demonstrate its usefulness and validity. Although the methodology discussed is not limited in scope, the plants addressed (and for which supporting data is included) are the conventional state-of-the-art plants in use today: Nuclear, 1200 PSI steam, Gas Turbine, Diesel and Combined Plants. The design approach is preceded by an introduction to the various propulsion plant fucntional areas. This discussion centers on the part these functional areas play in the overall design process and on how different plant types have both desirable and undesirable characteristics. The design approach coupled with the appendices is intended to enable a feasibility study to be made solely from the information contained in this thesis and a reasonable amount of input information. A sample problem using only the design approach and information in the thesis is presented to test this premise. (Author)

AD-A075 530/6 PC **A09**/MF **A01**
Naval Postgraduate School Monterey Ca
Marginal Cost Factors for High Performance Ships and their Impact on Subsystem Design.
Master's thesis,
Douglas Kearney Turner. May 78, 194p

Investigation reveals that major weapon, propulsion, and sensor subsystems, selected for use aboard Naval vessels, are designed many years prior to the development of a ship. The tendency, by Ship Acquisition Managers, to select off-the-shelf equipment is the result of various political pressures and a requirement to minimize the technical risk of the total ship system. Subsystem Designers develop their product without regard for the subsystem's impact on possible future ship designs. The physical characteristics (i.e. weight, required manning, electrical power, and space required) of a subsystem are not controlled and the growth of these parameters is a major factor in the escalating cost of Naval ships. To assist both the Ship and the Subsystem Acquisition Managers/Designers in controlling costs, Marginal Cost Factors are proposed. Previous work has demonstrated the validity of the concept of Marginal Factors to predict the ship-growth costs due to the impact of subsystems on conventional displacement ships. This thesis builds upon this work by using two ship synthesis computer models to generate Marginal Weight Factors for two high performance ship types of recent interest to the U. S. Navy - Hydrofoils and Suface Effect Ships. (Author)

PB80-105521 PC **A04**/MF **A01**
Swedish State Shipbuilding Experimental Tank, Goteborg.
Experimental Investigations of Cavitation Dynamics and Cavitation Noise,
Goran Bark, and Willem B. Van Berlekom. 1979, 72p PUB-83
Paper presented 1978-06-08 at the Twelfth Symposium on Naval Hydrodynamics, Washington, DC.

In this paper some of the research and development work on cavitation noise at the Swedish State Shipbuilding Experimental tank (SSPA) is described. This work is at SSPA mainly experimental and here two projects are described in detail. One of these projects concerns the relation between cavity dynamics and cavitation noise. This work was carried out using an oscillating hydrofoil in SSPA cavitation tunnel No 1. The other project concerns the relation between type of cavitation and cavitation noise. Different types of cavitation were generated using axisymmetric head forms and hydrofoils in SSPA cavitation tunnel No 1. Great efforts have been made at SSPA to develop adequate methods for measuring cavitation noise in cavitation tunnels. A short review of measuring techniques now in use is given in an introductory chapter.

PB80-801681 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Marine Propellers: Design and Fabrication (Citations from the NTIS Data Base).
Rept. for 1964-Nov 79,
Guy E. Habercom, Jr. Dec 79, 133p
Supersedes NTIS/PS-78/1177, NTIS/PS-77/1034, NTIS/PS-76/0803, and NTIS/PS-75/768. For the companion Published Search of the Engineering Index Data Base, see PB80-801699.

The design and manufacture of marine propellers are delineated in these Government-sponsored research reports. Ducted and cycloidal propellers are included in the investigations. Computer aided design and computer aided manufacturing methods are described. (This updated bibliography contains 124 abstracts, 5 of which are new entries to the previous edition.)

PB80-801699 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Marine Propellers: Design and Fabrication (Citations from the Engineering Index Data Base).
Rept. for 1970-Nov 79,
Guy E. Habercom, Jr. Dec 79, 205p
Supersedes NTIS/PS-78/1178, NTIS/PS-77/1035, and NTIS/PS-76/0804. For the companion Published Search of the NTIS Data Base, see PB80-801681.

The design and manufacture of marine propellers are delineated in these reports gathered in a worldwide literature survey. Counterrotating, ducted, and shrouded propellers are among the types reviewed. Computer aided design and computer aided manufacturing methods are described. (This updated bibliography contains 198 abstracts, 14 of which are new entries to the previous edition.)

13K. Pumps, Filters, Pipes, Fittings, Tubing and Valves

AD-A075 185/9 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Device for the Purification of Gas,
Yu. I. Firstov , R. G. Sabirov , Ya. Duvakin , Ya. M. Shchelokov , and V. P. Rychkov. 20 Dec 78, 8p Rept no. FTD-ID(RS)T-2163-78
Edited trans. of Patent (USSR) 317 399 p1-2, 19 Oct 71, by Charles T. Ostertag, Jr.

No abstract available.

METC/RI-79/6 PC **A05**/MF **A01**
Department of Energy, Morgantown, WV. Morgantown Energy Technology Center.

METC SOA Test Valve No. A-6: 6-Inch Rockwell Nordstrom Plug Valve.
J. F. Gardner. May 79, 85p

This report documents the results of ambient temperature static tests on a 6-inch Rockwell Nordstrom lubricated plug valve, ANSI Class 250, Rockwell Nordstrom Figure 265 (NETC SOA Test Valve A-6). The valve body and plug are of cast iron construction, with TFE coating of the plug surface. The objectives of the test were to determine baseline leakage rate and valve response time data. The test valve was cycled a total of 479 times during seven different runs. Run 07 was performed to establish baseline data for the new, factory-assembled valve. A total of 90 leak tests were performed during this run, while the total number of valve closure cycles at the end of this test period was 261. Leakage values remained within specification limits (6 scfm). Evidence of pressure being trapped in the plug was noted. Test Runs 07B through 07E were all performed in attempts to repeat the baseline leak rates results for Test Runs 07 and 07A after valve disassembly, inspection, and reassembly. This goal was not achieved as documented in the Procedure and Results section. Test Run 07F was performed after the valve plug and seat had been lapped to achieve metal to metal contact which is a different configuration than for prior tests which used plastic coating on the plug; both configurations used a lubricant seal, but different lubricants were used for each configuration. This arrangement yielded leak rate results which were 200% to 600% lower than the results of Test Runs 07 and 07A. However, intermittent leakage of unknown magnitude occurred which required maintenance of the valve including the addition of lubricant and increasing the load between plug and seat by tightening the packing gland. (ERA citation 04:050990)

N79-32601/3 PC **A03**/MF **A01**
Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section Construction Metallique.
Stress Concentration Factors in Spheres with Radial Flush Nozzles.
R. Beeckman. Feb 79, 28p CRIF-MT-129
Subm-Sponsored by Inst. Pour l'Encouragement de la Rech. Sci. Dans l'Ind. Et l'Agr. Conf-Presented at Seminar on Machine Mech., Ghent.

A parametrical study was made of the stress distribution in spherical vessels with a radially flush nozzle. Three loading cases are considered. These are internal pressure, thrust applied to the nozzle, and moment applied to the nozzle. Results show that as long as the shell structure can be considered as relatively thin and when the thickness of the nozzle does not exceed the thickness of the sphere, the maximum stress always occurs through the base of the nozzle for all loading cases. For the cases of thrust applied to the nozzle and moment applied to the nozzle this maximum stress is the meridional stress, whereas for the case internal pressure it is either the meridional or the circumferential stress, depending on geometrical parameters.

PB80-801418 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Air Pollution Control Using Particle Filtration (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Diane Cavagnaro. Dec 79, 182p
Supersedes NTIS/PS-78/1173 and NTIS/PS-77/1017.

The citations discuss technology, equipment design and performance, ultrafiltration, and size distribution factors. Aerosol and dust filtration are included. Studies on electrostatic precipitators have been excluded. (This updated bibliography contains 173 abstracts, 54 of which are new entries to the previous edition.)

13L. Safety Engineering

AD-A075 445/7 PC **A09**/MF **A01**
Naval Postgraduate School Monterey Ca
An Approach to the Problem of Measuring Safety Performance.
Master's thesis,
George Milt. Germanos. Sep 79, 185p

A literature survey concerning the problem of measuring safety performance was accomplished with primary emphasis to the problem of evaluating occupational injury and illnesses safety performance. Having accomplished this survey a new methodology for measuring occupational safety performance is proposed based on 'cost' criterion. Finally an analysis of real safety occupational data is accomplished since analysis of safety data is considered to be a basic step of the proposed methodology. (Author)

AD-A075 449/9 PC **A13**/MF **A01**
Office of Naval Research Arlington Va
Review of Lightning Protection Technology for Tall Structures Held at the Lyndon B. Johnson Space Flight Center, Houston, Texas, November 6, 1975.
31 Jan 77, 285p

The collection of papers and reported discussions in this volume represent an attempt to make some evaluation of the ability of corona-point arrays to absorb, suppress, eliminate, or in some way, protect against direct strike of lightning to surface structures. Those impaneled for the review and discussion are from among the best informed investigators of lightning phenomena in this country.

PAT-APPL-6-053 571 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Safety Shield for Vacuum/Pressure Chamber Viewing Port.
Patent Application,
R. A. Shimansky, and R. S. Spencer. Filed 29 Jun 79, 12p N79-32217/8, NASA-CASE-GSC-12513-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An optically clear safety shield, formed from a plate of Plexiglas, is mounted in a spaced-apart relationship from the viewing port on the outer surface of a vacuum or high pressure chamber. Because of the air gap between the viewing port and the safety shield, the shield is not subject to the cyclic stresses placed on the viewing window which tend to make it fail. Flying debris from a shattered viewing port window is deflected by the safety shield away from personnel and instruments in the vicinity of the chamber.

PB80-105844 PC **A03**/MF **A01**
Transport and Road Research Lab., Crowthorne (England).
The Edge-Locking Performance of Some Seat Belt Inertia Reels.
R. W. Lowne, A. K. Roberts, and G. R. Watts.
c1979, 30p TRRL-LR-882

Current accident experience clearly shows the benefits of wearing seat belts both of the static and the inertia reel variety. This report describes tests performed on some designs of inertia reel seat belts to identify possible problems relating to the malfunction of the locking mechanism under heavy braking or impact conditions. The study shows that with some designs there is a slight but significant risk that such malfunctions can occur. (Copyright (c) Crown Copyright 1979.)

PB80-801558 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Automobile Safety: Seat Belts (A Bibliography with Abstracts).
Rept. for 1964-Dec 79,
Mary E. Young. Dec 79, 229p
Supersedes NTIS/PS-78/1236, NTIS/PS-77/1146, NTIS/PS-76/1024, and NTIS/PS-75/735.

The development and use of passive safety restraint systems in motor vehicles are abstracted in the bibliography. Reports on seat belt and harness tests, accident investigations, physiological tests, and acceptability and use are included. (This updated bibliography contains 222 abstracts, 22 of which are new entries to the previous edition.)

PB80-802127 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Disasters: Effects, Preparedness, Assessment, and Recovery. Volume 1. 1964-1975 (A Bibliography with Abstracts).
Rept. for 1964-75,
Mary E. Young. Dec 79, 192p

Reports cited in the bibliography include emergency planning, communications and transportation systems, and damage recovery in disasters other than nuclear. Individual and organizational stress under emergency conditions, and the potential use of satellites to predict natural disasters are also included. (This updated bibliography contains 185 abstracts, none of which are new entries to the previous edition.)

PB80-802135 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Disasters: Effects, Preparedness, Assessment, and Recovery. Volume 2. 1976-November, 1979 (A Bibliography with Abstracts).
Rept. for 1976-Nov 79,
Mary E. Young. Dec 79, 213p
Supersedes NTIS/PS-78/1196, NTIS/PS-77/1078, NTIS/PS-76/0960, NTIS/PS-75/683, and NTIS/PS-75/007. See also Volume 1, 1964-1975, PB80-802127.

Reports cited in the bibliography include emergency planning, communications and transportation systems, and damage recovery in disasters other than nuclear. Reports are also included on individual and organizational stress under emergency conditions, and the potential use of satellites to predict natural disasters. (This updated bibliography contains 206 abstracts, 58 of which are new entries to the previous edition.)

SAND-79-0679 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Laboratory Evaluation of Two X-Ray Baggage Inspection Systems.
R. L. Schellenbaum. Jun 79, 47p
Contract EY-76-C-04-0789

The AS and E Micro-Dose X-ray Baggage Inspection System was designed for high-volume, detailed examination of packages at ultralow x-ray exposure levels. This system is used in airline terminals for the detection of weapons, bombs, and other contraband. It is also employed by security personnel in other facilities to search packages for contraband carried in and out of secured areas. The Micro-Dose system has a unique design concept which includes an Automatic Threat Alert System (ATA) and a zoom display presentation feature. (ERA citation 04:052085)

13M. Structural Engineering

AD-A075 204/8 PC **A04**/MF **A01**
Construction Engineering Research Lab (Army) Champaign Il
Current and Tentative Seismic Design Provisions for Buildings: Preliminary Comparisons.
Final rept.,
James D. Prendergast , and Walter E. Fisher.
Aug 79, 57p Rept no. CERL-TR-M-270

This report compares current and tentative seismic design provisions for two types of buildings: (1) Letterman Army Hospital, an existing 10-story, reinforced concrete building located in the Presidio of San Francisco, CA, whose design was based upon the 1964 Uniform Building Code (UBC), and (2) a three-story, ductile moment resistant steel frame building located in a region of high seismicity and designed as an essential building. The comparisons for Letterman Hospital include the magnitude and distribution of the seismic story shears and lateral deflections for the 1964 UBC, the 1975 Structural Engineers Association of California (SEAOC) provisions the 1978 Applied Technology Council's tentative design provisions (ATC-3) the TM 5-809-10 Appendix proposed design provisions, Agababian Associates' (AA) two-dimensional time history modal analysis, U.S. Army Construction Engineering Research Laboratory's (CERL) three-dimensional response spectrum modal analysis and PMB Systems Engineering Incorporated's (PMB) three-dimensional response spectrum modal analysis. The comparisons for the three-story, ductile moment resistant steel frame building

include the seismic design forces, story shears, lateral deflections, member sizes, and frame weights for the transverse direction if the building when designed in accordance with the 1975 SEAOC provisions, the 1978 ATC-3 equivalent lateral force procedure, the 1978 ATC-3 modal analysis procedure, and the TM 5-809-10 Appendix proposed provisions.

JAB-00099-124 PC **A05**/MF **A01**
URS/John A. Blume and Associates, San Francisco, CA.
Santa Barbara Earthquake of August 13, 1978: Field Data Report.
R. A. Philbrick, and G. N. Owen. Aug 79, 100p
Contract EY-76-C-08-0099

On August 31 and September 1, 1978, a field study was conducted of the damage inflicted on structures in the Greater Santa Barbara area by a magnitude-5.1 earthquake that occurred there on August 13, 1978. The study was undertaken to determine the general nature and extent of damage to all types of structures. Particular attention was given to the damage sustained by mobile homes because the damage to these structures during the earthquake was more extensive than expected. Other structures included in the field study were the University of California, Santa Barbara, buildings, Santa Barbara County government buildings, and private buildings. The results of this field study combined with the results of other, similar studies can be used to determine relationships between ground motion and damage. The data collected will be useful to earthquake engineers working to improve analytical procedures for predicting damage inflicted on structures by ground motion. 84 figures, 3 tables. (ERA citation 04:052243)

PB80-801962 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Wind Effects. Part 1. Buildings and Bridges (Citations from the NTIS Data Base).
Rept. for 1964-Nov 79,
Guy E. Habercom, Jr. Dec 79, 206p
Supersedes NTIS/PS-78/1207, NTIS/PS-77/1063, NTIS/PS-76/0949, and NTIS/PS-75/870. For the companion Published Search of the Engineering Index Data Base, see PB80-801988.

Dynamic structural responses of buildings and bridges to wind pressure and gust loads are investigated in these Government-sponsored research reports. Residential buildings, skyscrapers, and bridge structures exposed to winds are studied. (This updated bibliography contains 200 abstracts, 29 of which are new entries to the previous edition.)

PB80-801988 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Wind Effects. Part 1. Buildings and Bridges (Citations from the Engineering Index Data Base).
Rept. for 1970-Nov 79,
Guy E. Habercom, Jr. Dec 79, 319p
Supersedes NTIS/PS-78/1209, NTIS/PS-77/1065, and NTIS/PS-76/0951. For the companion Published Search of the NTIS Data Base, see PB80-801962.

Dynamic structural response of buildings and bridges to wind pressure and gust loads are investigated in these reports gathered from a worldwide literature survey. (This updated bibliography contains 313 abstracts, 32 of which are new entries to the previous edition.)

14. METHODS AND EQUIPMENT

14B. Laboratories, Test Facilities, and Test Equipment

AD-A075 172/7 Not available NTIS
National Aeronautics and Space Administration Moffett Field Ca Ames Research Center
Improving Large-Scale Testing Capability by Modifying the 40- by 80-ft Wind Tunnel,
Kenneth W. Mort , Paul T. Soderman , and William T. Eckert. 16 Jun 77, 6p
Availability: Pub. in Jnl. of Aircraft, v16 n8 p571-575 Aug 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 215/4 MF **A01**
Dayton Univ Oh Research Inst
The Scaling of Bird Impact Loads.
Final technical rept. 16 Jan 78-16 Feb 79,
Antonios Challita , and John P. Barber. Jun 79, 67p UDR-TR-79-23, AFFDL-TR-79-3042
Contract F33615-78-C-3402
Availability: Microfiche copies only.

This report describes an experimental study which was conducted to investigate the loads produced by the impact of 1800 g and 3600 g birds. Both real birds and bird simulants were tested. Impact pressures were measured and compared with smaller bird impact results obtained on previous testing programs. The magnitude of the impact pressures was found to be independent of bird size. The temporal and spatial distribution of impact pressures scaled linearly with bird dimensions. The impact behavior of large birds was consistent with flow models developed to describe small bird impacts. It was concluded that large and small birds display the same fundamental impact loading processes and that these processes are adequately described by the previously developed flow model. (Author)

AD-A075 284/0 PC **A04**/MF **A01**
Virginia Polytechnic Inst and State Univ Blacksburg Dept of Engineering Science and Mechanics
Nondestructive Evaluation of Damage in Metal Matrix Composites.
Interim technical rept.,
Edmund G. Henneke , Kenneth L. Reifsnider , Wayne W. Stinchcomb , and John C. Duke. 31 Jan 79, 53p
Contract N00014-78-C-0153

The basic objectives of this work were: to apply nondestructive evaluation techniques to metal matrix composites; to obtain base line data as to the ability of these techniques to locate, identify and quantify defects in these materials; to determine the effect of these defects on strength and stiffness; and to modify the techniques as required for application to specimens having geometries other than the flat tensile coupon. Several different nondestructive testing techniques have been considered for possible application to metal matrix composites. A description of these is given in the following pages. Some of these methods have been applied during the past year to Al/Fp fiber composites while others have been investigated in a preliminary fashion in order to determine potential problem areas that will need to be solved for proper application in the coming year.

AD-A075 320/2 PC **A06**/MF **A01**
Effects Technology Inc Santa Barbara Ca
Tri-The Development of a Fast-Response Time-Resolved Impulse Gage.
Final rept. 29 Jul 76-30 Apr 78,
W. M. Isbell , and W. J. Naumann. 30 Apr 78, 124p ETI-CR-78-550, DNA-4658F, AD-E300 592
Contract DNA001-76-C-0357

A time-resolved impulse gage was developed to provide data to fill the gap between the longest duration stress gages (approximately 5 microsec max.) and the fastest of the recoil gages (approximately 50 microsec min.). The characteristics of the new gage include: impulse range 0.5 to 20 ktaps, risetime 10-15 microsec, read time 300-1500 microsec, accuracy + or - 10%, electrical output 1.32 volt/ktap. The gage was specifically developed to record the pressure-time history of 'tamped' UGT experiments, where metallic vapors produced by rapid energy deposition on a specimen material are not free to expand indefinitely, but are trapped in a gap between the specimen surface and a low Z material through which the radiation has passed. The gage measures both 'prompt' impulse from the initial rapid expansion of the vapors and the 'late-time' impulse from the pressure created within the gap. The gage exhibits good linearity, high electrical output, and a wide dynamic range. Other utilizations of the gage besides UGT experimentation include electron-beam and laser effects studies. (Author)

AD-A075 366/5 PC **A03**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground Md Ballistics Research Lab
Manganin Gage Pressure Measurements under Conditions Where Gage Deformation Occurs.
Final rept.,
John J. Trimble. Jul 79, 35p ARBRL-TR-02180, AD-E430 297

It is sometimes desirable to use manganin piezoresistive pressure gages under conditions where gage deformation occurs. In such circumstances, the pressure can be measured only if the strain on the gage is measured independently and if the strain coefficient of the gage is known. We have experimentally determined the strain coefficient of manganin gages as a function of strain at a range of pressures and strain rates. For small strains (less than 0.1 percent), the strain coefficient is about 0.67. As strain occurs, the strain coefficient increases to a value of about 2. In cantilever beam tests, with no pressure on the gage, the transition occurs slowly, and the strain coefficient reaches the value of 2 at about 2 percent strain. In a test where pressure and strain are applied simultaneously, the transition is more rapid and the strain coefficient attains a value of about 1.8 at 0.5 percent strain. (Author)

AD-A075 586/8 PC **A09**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Oh School of Systems and Logistics
An Operating and Support Cost Model for Avionics Automatic Test Equipment.
Master's thesis,
Joel A. Guerra , Andrew J. Lesko , and Jose G. Pereira. 7 Sep 79, 180p Rept no. AFIT-LSSR-21-79B

One of the fastest growing elements of weapon system support equipment which relates directly to Operating and Support (O and S) costs is Automatic Test Equipment (ATE). The importance of ATE has expanded to such a degree that it requires additional management attention. The importance is exemplified by the $600 million projected development and acquisition costs of ATE for the F-16. This amount of cost qualifies the F-16 ATE for major program status. This thesis documents the development of a model to estimate and measure O and S costs for Avionics ATE. The model will be an important addition to the tools used in ATE Life Cycle Costing (LCC) techniques. It is envisioned primarily as an evaluation tool to be used in ATE source selection, but may also be useful in various design trade-off studies. (Author)

N79-32159/2 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Review of Design and Operational Characteristics of the 0.3-Meter Transonic Cryogenic Tunnel.
E. J. Ray, C. L. Ladson, J. B. Adcock, P. L. Lawing, and R. M. Hall. Sep 79, 56p NASA-TM-80123
Conf-Presented at 1ST Intern. Symp. On Cryogenic Wind Tunnels, Southampton, Engl., 3-5 Apr. 1979.

The past 6 years of operation with the NASA Langley 0.3 m transonic cryogenic tunnel (TCT) show that there are no insurmountable problems associated with cryogenic testing with gaseous nitrogen at transonic Mach numbers. The fundamentals of the concept were validated both analytically and experimentally and the 0.3 m TCT, with its unique Reynolds number capability, was used for a wide variety of aerodynamic tests. Techniques regarding real-gas effects were developed and cryogenic tunnel conditions can be set and maintained accurately. Cryogenic cooling by injecting liquid nitrogen directly into the tunnel circuit imposes no problems with temperature distribution or dynamic response characteristics. Experience with the 0.3 m TCT, indicates that there is a significant learning process associated with cryogenic, high Reynolds number testing. Many of the questions have already been answered; however, factors such as tunnel control, run logic, economics, instrumentation, and model technology present many new and challenging problems.

N79-32219/4 PC **A08**/MF **A01**
Lockheed-Georgia Co., Marietta.

Estimation of Tunnel Blockage from Wall Pressure Signatures: A Review and Data Correlation.
J. E. Hackett, D. J. Wilsden, and D. E. Lilley. Mar 79, 170p NASA-CR-152241
Contract NAS2-9883

A method is described for estimating low speed wind tunnel blockage, including model volume, bubble separation and viscous wake effects. A tunnel-centerline, source/sink distribution is derived from measured wall pressure signatures using fast algorithms to solve the inverse problem in three dimensions. Blockage may then be computed throughout the test volume. Correlations using scaled models or tests in two tunnels were made in all cases. In many cases model reference area exceeded 10% of the tunnel cross-sectional area. Good correlations were obtained regarding model surface pressures, lift drag and pitching moment. It is shown that blockage-induced velocity variations across the test section are relatively unimportant but axial gradients should be considered when model size is determined.

N79-32224/4 PC **A03**/MF **A01**
Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
Construction Problems for High Reynolds Number Wind Tunnel Models.
M. Bazin. 1978, 36p ONERA-NT-1978-6
Conf-Presented at 14th Colloq. D'Aerodyn. Appl. De l'Assoc. Aeron. Et Astron. De France, Toulouse, 7-9 Nov. 1977. Misc-Report Will Also Be Announced as Translation (ESA-TT-564).In French; English Summary.

The choice of materials, the structural design of the model and of removable or motorized elements as well as problems of definition are presented. Models for weighings and determining pressure distribution along with models of air intakes, of jet simulation, and dynamic flutter models are considered. The model definition and machining, relative to time and cost constraints that entail new construction methods, are discussed. It is shown that deformations in operation, under the effect of aerodynamic and thermal loads, require the implementation of new measuring techniques. The capacity, thermal protection, and calibration methods of the balances also have to be adapted. The mechanical strength of the supports, in particular regarding the risk of divergence, and the dynamic behavior of the mountings are the most severe limitations in the use of pressurized wind tunnels. Thermal effects are added in a cryogenic environment. These effects concern instrumentation considered and the evolution of detectors as well as of pressure measurement methods and instruments is considered.

N79-32304/4 PC **A02**/MF **A01**
Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
Nanogram Techniques. 2: Microscale Preparative Gas Chromatography.
I. Klimes, W. Stuenzi, and D. Lamparsky. 1979, 23p NRC/CNR-TT-1951, ISSN-0077-5606
Tran-Transl. Into English from J. Chromatogr. (Netherlands), V. 136, 1977 p 23-36.

The methods used for a nearly quantitative recovery of injected materials are described. Different parameters were evaluated in order to find the best suited operation conditions. The use of capillary tubes as trapping vials give good results if the tube is filled with small cotton pieces and cooled by means of a mixture of dry ice and liquid nitrogen. The full range of resolution power given by the packed analytical or even the capillary GLC columns for preparative purposes can be utilized in comparison to the normal preparative gas-liquid chromatographic methods.

N79-32305/1 PC **A02**/MF **A01**
Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
Nanogram Techniques. 1: Injection Without Losses on Capillary Columns.
I. Klimes, W. Stuenzi, and D. Lamparsky. 1979, 15p NRC/CNR-TT-1950, ISSN-0077-5606
Tran-Transl. Into English from J. Chromatogr. (Netherlands), V. 136, 1977 p 13-21.

A simple double-cone device, prepared from a glass capillary tube and placed in the injection port on top of a glass capillary gas-liquid chromatographic column, enables the injection of the total amount of material on to the column without losses by by-pass splitters. A syringe with lengthened piston permits the injection of material without prior dilution. This modified syringe is also well suited for handling of head-space samples and for rapid detection of polarity of unknown components in the analyzed substrate.

N79-32444/8 PC **A02**/MF **A01**
Technische Universitaet, Munich (Germany, F.R.). Lehrstuhl fuer Raumfahrttechnik.
Zur Geschwindigkeitsmessung Kleiner Teilchen Mittels Mikrowellen (Measurement of the Velocity of Small Projectiles Using Microwaves).
K. Kaufmann. Apr 77, 17p TUM-LRT-RT-TB-77/01
Language in German.

Methods and techniques applicable to the determination of micrometeorite characteristics in space are studied. Simulation experiments were performed with 0.1 to 1 mm diameter spherical projectiles (glass or metal) accelerated up to 20 km/sec. Reflection cross sections (at different wavelengths), antenna performance (with a parabolic mirror or a lens for enhanced directional operation), signal generation, and choice of frequency were investigated. A 70 to 140 GHz band was selected (cost optimization trade-off). Projectile velocity measurements with a Doppler-Radar-System (with mixer) are described as is the system (incorporating a reflection grating) used, to assure the triggering of a camera at the correct time for projectile photographs.

N79-32452/1 PC **A03**/MF **A01**
National Physical Lab., Teddington (England). Acoustics Unit.
A Damped Flat-Plate Coupler for Use in Calibrating Circumaural Earphones.
M. E. Delany, and E. N. Bazley. Mar 79, 29p NPL-AC-90

Published work relating to the calibration of circumaural earphones for use in audiometry is reviewed. A theoretical analysis of an idealized circumaural cavity consisting of a loss-free rigid cylinder driven at one end by a high impedance source is given, followed by a solution for the one-dimensional case of an absorbent filled cavity terminated by finite impedance transducers. Conclusions from this theory were comfirmed experimentally. On this basis the acoustical properties and geometry of a pad of absorbent material suitable for conclusion in a flat-plate coupler to damp spurious resonances are established and recommendations towards standardization made. Response curves for typical circumaural earphones on the damped flat-plate coupler are presented.

N79-32526/2 PC **A04**/MF **A01**
Benton Corp., Manor, Pa.
Design Fabrication and Installation of a Yaw Measuring Device.
Final Report.
30 Jun 79, 53p NASA-CR-161300, REPT-210-1006
Contract NAS8-33209

The results of work performed in the development and testing of a yaw measuring device are summarized. A review of the yaw measurement method; and the techniques and hardware needed for its implementation are presented. A description and summary of the tests performed at the U.S. Bureau of Mines Bruceton facility are included. Conclusions are summarized and recommendations for a unit capable of operation in a mine environment are presented.

N79-32531/2 PC **A05**/MF **A01**
Leybold-Hochvakuum-Anlagen G.m.b.H., Cologne (Germany, F.R.). Vacuum Components and Standard Systems Div.
Manometers for Extremely Low Pressure.
Final Report.
G. Reich. Dec 78, 93p BMFT-FB-T-78-38
Contract BMFT-NT-0051
In German; English Summary.

Research and development work was done in the field of very low pressure measurements in order to better define low pressure phenomena and to test, improve, or develop measuring equipment and techniques. The potential of modern electronic components used in vacuum gage control units were investigated. An extractor ionization vacuum gage head and gage control unit for the total pressure range between 1/10,000 and 1/10 trillion torr were tried. High stability ion sources designed on the extractor principle for partial pressure gages were studied. A high sensitivity magnetic sector mass spectrometer with z-focusing was tested and a quadrupole mass spectrometer with a control unit for the mass range up to 200 for measurement of partial pressure down to 1/10 trillion torr was developed.

N79-32533/8 PC **A03**/MF **A01**
National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
A Review of the Fundamental Methods Used for Measuring Gage Pressures Up to kPa.
G. N. Peggs. Oct 78, 39p NPL-MOM-34

The accurate measurement of gage pressures up to about 1 kPa has important applications, especially in the field of aircraft instrumentation. The use of a number of primary standard instruments, with an uncertainty of measurement of about + or - 0.1 Pa, is described. These instruments are reviewed and detailed estimates of their uncertainties made. A brief outline of the procedures employed for the calibration of other instruments is also given.

N79-32557/7 PC **A03**/MF **A01**
National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
A New Method for the Measurement of Rockwell Diamond Indenters.
P. J. Nash. Oct 78, 36p NPL-MOM-33

An instrument was designed to yield measurements showing the effective radius, departure from a given radius, and the position of the radius with respect to the conical flanks of the Rockwell C scale indenter. The surface of the indenter tip was located by means of a microscope fitted with a Michelson interference objective. White light illumination was used so that the fringes obtained between the reference plane and the convex indenter surface could be indentified by their color. The zero order fringe could then be used as a fiducial setting, by moving the microscope until the fringe was at the center of the bull's eye interference pattern. Some idea of the shape of the indenters could be gained from the fringe pattern. On the spherical cap, good indenters showed reasonable even bulls eye' patterns of concentric rings, while others had irregularly shaped fringes. For a perfect indenter, the flank setting should show the zero order fringe as a straight line, with the other, colored fringes symmetrically disposed on either side.

N79-32968/6 PC **A08**/MF **A01**
Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
Synchronization of Clocks in the 100 Ps Range.
Master's Thesis.
J. P. Moreau. 1978, 173p ONERA-NT-1978-1
Misc-Translation Is in Process as ESA-TT-578.
In French; English Summary.

A method for measuring, with high resolution (100 ps), the differences between two distant atomic clocks is presented. After an analysis of the elementary actions making up a synchronization operation, the main characteristics of the set of measuring units are determined. The principle of the system proposed is described as the transfer of the time information by optical channel, using a semiconductor laser. The various of the chain (time scales, transducers, telescopes, chronometers) are then described and calculated. The results of two experiments are presented; one concerns the synchronization of clocks 6 km apart, the other that of the time keepers of the Paris, France, and San-Fernando, Spain observatories. It is concluded that the synchronization method by laser beam, as described, makes it possible to reach the expected accuracy of 100 ps when the clocks are in line of sight of each other, and is better than 1 ns when they are separated by several hundred kilometers making it necessary to use an airborne transfer clock.

N79-33221/9 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Cryogenic Wind Tunnels: A Selected Annotated Bibliography.
M. H. Tuttle, and R. A. Kilgore. Oct 79, 30p NASA-TM-80168, L-13309

The design and characteristics of cryogenic wind tunnels are discussed in the 124 publications included. Evaluations of cryogenic fluids used as wind tunnel test gases and tests performed in the cryogenic wind tunnels are reported.

N79-33451/2 PC **A04**/MF **A01**
Perkin-Elmer Corp., Pomona, Calif. Aerospace Div.
The Addition of EI/CI Capability to the Mattauch-Herzog Spectrograph with EOID.
Final Report.
G. J. Fergusson, and M. E. Koslin. Aug 79, 68p NASA-CR-162363
Contracts NAS7-100, JPL-954464
Subm-Prepared for JPL.

A modification was made to the Mattauch-Herzog Spectrograph with an electro-optical ion detector (EOID) previously designed and constructed, so that it would be capable of operating not only in the electron-impact (EI) mode of ionization, but also in the chemical ionization (CI) mode. This modification necessitated an effort in three specific design areas: (1) sample iniet; (2) ion source and analyzer regions; and (3) the pumping system. In addition, an appropriate electronics package had to be designed to control and operate the combined EI/CI source.

N79-33452/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, D. C.
Use of Piezoelectric Multicomponent Force Measuring Devices in Fluid Mechanics.
A. Richter, and K. Stefan. Sep 79, 15p NASA-TM-75444
Contract NASW-3199
Tran-Transl. Into English from Arch. Fuer Tech. Mess. Messentech. Prax. (West Germany), No. 446, Mar. 1973 p 41 -44. Misc-Original Language Document Was Announced as A73-27871. Subm-Transl. By Kanner (Leo) Associates, Redwood City, Calif.

The characterisitics of piezoelectric multicomponenet transducers are discussed, giving attention to the advantages of quartz over other materials. The main advantage of piezoelectric devices in aerodynamic studies is their ability to indicate rapid changes in the values of physical parameters. Problems in the accuracy of measurments by piezoelectric devices can be overcome by suitable design approaches. A practical example is given of how such can be utilized to measure rapid fluctuations of fluid forces exerted on a circular cylinder mounted in a water channel.

N79-33529/5 PC **A07**/MF **A01**
Environmental Sensing Algorithm Development Co., Sunland, Calif.
Evaluation and Analysis of SEASAT-A Scanning Multichannel Microwave Radiometer (SMMR) Antenna Pattern Correction (APC) Algorithm.
Final Report.
J. L. Kitzis, and S. N. Kitzis. 28 Sep 79, 148p NASA-CR-162346
Contracts NAS7-100, JPL-955368
Subm-Prepared for JPL.

An evaluation of the versions of the SEASAT-A SMMR antenna pattern correction (APC) algorithm is presented. Two efforts are focused upon in the APC evaluation: the intercomparison of the interim, box, cross, and nominal APC modes; and the development of software to facilitate the creation of matched spacecraft and surface truth data sets which are located together in time and space. The problems discovered in earlier versions of the APC, now corrected, are discussed.

N79-33611/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Measurement Techniques for Trace Metals in Coal-Plant Effluents: A Brief Review.
J. J. Singh. Oct 79, 34p NASA-RP-1047, L-13164

The strong features and limitations of techniques for determining trace elements in aerosols emitted from coal plants are discussed. Techniques reviewed include atomic absorption spectroscopy, charged particle scattering and activation, instrumental neutron activation analysis, gas/liquid chromatography, gas chromatographic/mass spectrometric methods, X-ray fluorescence, and charged-particle-induced X-ray emission. The latter two methods are emphasized. They provide simultaneous, sensitive multielement analyses and lend themselves readily to depth profiling. It is recommended that whenever feasible, two or more complementary techniques should be used for analyzing environmental samples.

PB80-100654 PC **A03**/MF **A01**
Tennessee Valley Authority, Muscle Shoals, AL. Office of Natural Resources.
Design of Photochemical Reaction Chamber,
L. Stockburger, and J. F. Meagher. Jul 79, 39p TVA/ONR-79/02

A 1100-cu. ft. Teflon photochemical reaction chamber has been constructed by the Tennessee Valley Authority (TVA) to study chemical reactions that occur in dilute coal-fired power plant plumes. The chamber will be used to study, under controlled conditions, the gaseous and gas particulate reactions using actual flue gas under solar or simulated solar conditions. The chamber and associated instruments are transportable to allow evaluation of secondary pollutant formation from existing and new energy control technologies.

PB80-104367 Not available NTIS
National Bureau of Standards, Washington, DC.
Calibration of Combustion Calorimeters.
Final rept.,
C. Mosselman, and K. L. Churney. 1979, 21p
Pub. in Combustion Calorimetry, n1, Chapter 3, p35-55 1979.

The theory and design of combustion calorimeters has been reviewed in terms of recent improvements in the precision of the measurement theory of isoperibol calorimeters. Calculation of the adiabatic temperature rise is discussed in terms of the linear approximation for treatment of the temperature-time data of rating periods. Practical considerations dealing with the validity of a proper execution of calibration experiments using either a reference substance, whose energy of combustion is know, or electrical calibration equipment are outlined.

14C. Recording Devices

N79-32534/6 PC **A04**/MF **A01**
Royal Aircraft Establishment, Farnborough (England).
The Design of an Error Detection and Correction System for Use with Single Track Airborne Digital Magnetic Recording Systems.
C. W. Jackson. Apr 78, 59p RAE-TM-IT-171, BR64334

The types of error that can occur in airborne digital magnetic recording systems are described, and the problems associated with the correction of these errors on medium and high packing density single track systems are discussed. Some methods whereby record/replay errors on single track systems may be detected and corrected are explained and a description is given of a system using these principles. Sufficient design work was completed to show that the system is a practical one to construct.

14D. Reliability

AD-A075 520/7 PC **A08**/MF **A01**
ARINC Research Corp Annapolis Md
The Application of Reliability Improvement Warranty to Dynamic Systems.
Final technical rept. 26 Sep 78-4 Sep 79,
A. A. Bilodeau , F. B. Crum , W. A. Dunphy , and R. A. Kowalski. 4 Sep 79, 167p 1736-01-1-2025, MERADCOM-TQ-1
Contract DAAK70-78-C-0200

The Reliability Improvement Warranty (RIW) is currently used within the Department of Defense to provide an incentive to contractors to design and produce equipment that will have a low failure rate, as well as low costs of repair following failure in field or operational use. Current applications of RIW have generally been restricted to initial production procurements of relatively small, transportable avionics equipment. The RIW concept has potential applications for dynamic systems (e.g., transmissions, gearboxes, engines, etc.) procured by the U.S. Army Mobility Equipment Research and Development Command (MERADCOM). However, dynamic systems may differ from avionics in design and maintenance concepts, transportability features, and deployment and utilization philosophy. Therefore, current criteria for using RIW and current guidelines for developing RIW terms and conditions should be reviewed and adapted for this new class of systems. This effort identified several differences between the characteristics of dynamic systems and those of RIW avionics equipment that are not emphasized in current RIW guidelines. RIW application criteria for dynamic systems were also developed. An existing life-cycle cost (LCC) model was modified to address quantitative features of dynamic systems that should be considered in an economic analysis of RIW versus organic maintenance. Case studies were developed to demonstrate the use of the RIW selection criteria and the LCC model. (Author)

AD-A075 579/3 PC **A03**/MF **A01**
Stanford Univ Ca Dept of Operations Research
Bounding the Reliability of Multistate Systems.
Technical rept.,
David A. Butler. 15 Aug 79, 38p Rept no. TR-193
Contract N00014-75-C-0561

This report develops a number of upper and lower bounds for the reliability of multistate systems, that is, systems for which each component may exist in one of a finite number of states. These bounds are based on notions of multistate minimal paths and minimal cuts. The bounds are far more easily computed than the exact system reliability. In order to further reduce the computations required and obtain sharper bounds, a modular-decomposition-based bound is developed for multistate systems. (Author)

N79-32877/9 PC **A07**/MF **A01**
Michigan Univ., Ann Arbor. Systems Engineering Lab.
METAPHOR (Version 1): Users Guide.
D. G. Furchtgott. Jul 79, 142p NASA-CR-162322, REPT-014524-9-T
Grant NSG-1306

General information concerning METAPHOR, an interactive software package to facilitate performability modeling and evaluation, is presented. Example systems are studied and their performabilities are calculated. Each available METAPHOR command and array generator is described. Complete METAPHOR sessions are included.

N79-32906/6 PC **A03**/MF **A01**
Michigan Univ., Ann Arbor. Systems Engineering Lab.
Performability Modeling with Continuous Accomplishment Sets.
J. F. Meyer. Jul 79, 32p NASA-CR-162323, REPT-014524-10-T
Grant NSG-1306

A general modeling framework that permits the definition, formulation, and evaluation of performability is described. It is shown that performability relates directly to system effectiveness, and is a proper generalization of both performance and reliability. A hierarchical modeling scheme is used to formulate the capability function used to evaluate performability. The case in which performance variables take values in a continuous accomplishment set is treated explicitly.

14E. Reprography

AD-A075 095/0 PC **A02**/MF **A01**
Naval Research Lab Washington Dc
EXPAND: An Editing Routine for Stromberg-Carlson Movie Files.
Memorandum rept.,
R. C. Shockley , and M. J. Fritts. 20 Sep 79, 23p Rept no. NRL-MR-4061

The increasing use of movies in various research activities at NRL has created a demand for subroutine packages which make edit movie files which contain Stromberg-Carlson commands. EXPAND and EDITSC are respectively, a worker subroutine and a simplified FORTRAN driver subroutine which allow considerable freedom in editing movie files. Options include replicating or deleting arbitrary frames or groups of frames, inserting blank frames between any frames or group of frames (to give borders for handmade slides), merging separate movie files, and splitting one movie into several. Details of these routines are discussed in sufficient depth to indicate where changes in EXPAND could be made to increase the editing flexibility (e.g. the addition or changing of color wheel commands, or circumventing the limits in EXPAND on the size of input and output files). (Author)

AD-A075 377/2 PC **A05/MF A01**
Mead Technology Labs Dayton Ohio
Color Ink-Jet Demonstration Program.
Final rept.
19 Sep 79, 79p FR-79-4, ETL-0196
Contract DAAK70-78-C-0229

A demonstration program was conducted to evaluate the use of ink-jet imaging technology for color map reproduction. A single-color laboratory copier was modified for three-color operation by adding two additional scan towers and ink-jet arrays. Extensive ink compatibility testing was performed to insure adequate operation with the system and the high wet strength map paper. The demonstration proved that the desired resolution and geometric fidelity could be obtained. Samples with 300 line-per-inch resolution were produced. True color balance could not be achieved within the funding and schedule constraints of the program, however, due to the breadboard nature of the device and the need for additional, individual channel controls and improved system reliability. (Author)

15. MILITARY SCIENCES

15B. Chemical, Biological, and Radiological Warfare

AD-A075 325/1 PC **A05/MF A01**
Environmental Research Co St Paul Mn
Systematic Investigation of the Design Parameters of a Slit Aerosol Concentrator.
Final rept. Nov 76-Nov 78,
Leonard Graf. Nov 78, 85p ERC-8-7850, ARCSL-CR-79003, AD-E410 189
Contract DAAA15-77-C-0007

An investigation was made of the parameters which affect performance of a slit aerosol concentrator. Some of the parameters investigated were nozzle shape, air flow patterns, inlet nozzle width and velocity, receiver nozzle width, and spacing between inlet and receiver nozzle. Graphical and mathematical analysis of the test data was made to define the optimum parameters for a slit concentrator. Four slit concentrators were designed, fabricated and tested. (Author)

15C. Defense

AD-A075 137/0 PC **A05/MF A01**
Federal Emergency Management Agency Washington Dc
Civil Defense and the Public: An Overview of Public Attitude Studies.
Research summary rept. no. 17, 1950-1979,
Ralph L. Garrett. Aug 79, 91p Rept no. MP-62

This report outlines relevant aspects of civil defense history and provides a general overview of public attitudes during the past 25 years. Public attitude findings are summarized under such topics as the international context, threat perception, general favorability, program support salience, perceptions of local programs perceptions of shelters as a survival resource, response to warning, and training and education impact. Findings are reviewed relevant to such special audiences as information seekers, youth, local governing bodies, volunteers and voluntary associations, and the community power structure. The credibility and acceptance of crisis relocation programs, home basement sharing, and blast shelter programs are discussed. The implications of the findings and their bearing on program development are reviewed.(Author)

AD-A075 418/4 PC **A05/MF A01**
Naval Postgraduate School Monterey Ca
An Analysis of the National Defense Reserve Fleet, the Ready Reserve Force Component and Their Capability to Meet National Emergency.
Master's thesis,
Louis Francis Harlow. Sep 79, 81p

This study examines various facets of activating the National Defense Reserve Force. Its history and background are reviewed and its present status of readiness considered. Specific areas covered are monetary costs, manpower capabilities (seagoing and ashore) as well as the physical condition and capabilities of the fleet. The substructure of the Reserve Fleet known as the Ready Reserve Force is covered in depth. In this area the inception of the ready force idea is presented along with its goals and accomplishments to date. Of unique interest is the joint funding of the Ready Reserve Force which is contributed to by both the Department of Commerce and the Department of Defense. Conclusions are drawn from its past performance, documented present status, and projected industrial capabilities. (Author)

AD-A075 436/6 PC **A03/MF A01**
Army Command and General Staff Coll Fort Leavenworth Ks
The Implications of Soviet Civil Defense.
Research study,
Gerald R. Denny. May 79, 38p

Covers the use, by the Soviets of Civil defense as population protection and in their warmaking capability. Shows relationship of civil defense and Soviet nuclear war capability. (Author)

15E. Logistics

AD-A075 260/0 PC **A04/MF A01**
General Research Corp Mclean Va
The Qualified Military Available Projection System. Volume I. Overview and Detailed Methodology.
Final rept. 1977-1978,
Daniel F. Huck , Alison Crews , and Geraldine P. Sica. Sep 78, 68p Rept no. GRC-CR-224-VOL-1
Contract MDA903-75-C-0204
See also Volume 2, AD-A075 347.

Volume I details the methodology used to estimate and project Qualified Military Available (QMA) populations by race, sex, education, mental group, and geographical boundaries. The QMA is the population of 17-21-year-old persons who have no prior military service and who are physically and mentally qualified for such services. Volume II contains detailed program and file documentation. (Author)

AD-A075 347/5 PC **A11/MF A01**
General Research Corp Mclean Va
The Qualified Military Available Projection System. Volume II. Flowcharts and Program Documentation.
Final rept. 1977-1978,
Daniel F. Huck , Alison Crews , and Geraldine P. Sica. Sep 78, 236p Rept no. GRC-CR-224-VOL-2
Contract MDA903-75-C-0204
See also Volume 1, AD-A075 260.

Volume I details the methodology used to estimate and project Qualified Military Available (QMA) populations by race, sex, education, mental group, and geographical boundaries. The QMA is the population of 17-21-year-old persons who have no prior military service and who are physically and mentally qualified for such service. Volume II contains detailed program and file documentation. (Author)

AD-A075 435/8 MF **A01**
Army Command and General Staff Coll Fort Leavenworth Ks
A Comparative Analysis of the Fighter Aircraft Acquisition Process in the United States and the Soviet Union.
Research study,
Harry J. Kieling, Jr. May 79, 31p
Availability: Document partially illegible.

Analysis of particulars of how U.S. acquires fighter aircraft and the process used. Procedures on how Soviet acquisition proceeds is contrasted with US procedures. (Author)

AD-A075 438/2 PC **A04/MF A01**
Army Command and General Staff Coll Fort Leavenworth Ks
Strategic Airlift: Current Capabilities and Future Trends.
Research rept.,
Wallace E. Cooper, Jr. May 79, 51p

This paper defines current United States airlift capabilities and highlights the shortfall in our total airlift capability. Several short to mid-term solutions are brought out, including the C-5 wing modification, C-141 stretch and air refueling modification, addition of the Advanced Medium Short-Takeoff/Landing Transport to our airlift inventory and the modification of the aircraft in the Civil Reserve Air Fleet.

AD-A075 494/5 PC **A05/MF A01**
Army Infantry School Fort Benning Ga
Combat Logistics Handbook.
1st edition.
1966, 99p

This handbook is designed to provide the student with a single source reference on the logistical portion of the combat service support system within the division, and to aid the student in understanding combat logistics. This handbook contains a general discussion of territorial and command organization of a theater of war, and definitive considerations of logistical organizations, trains, operations, and planning at the combat battalion, brigade, and to a lesser degree, the division level.

AD-A075 531/4 PC **A04/MF A01**
Army Command and General Staff Coll Fort Leavenworth Ks
Second Destination Transportation: Program Management and Force Readiness.
Research study,
Andrew J. McIntyre, Jr. May 79, 62p

The Air Force Second Destination Transportation program is vital to Air Force operational readiness. It provides resources to support the material movement requirements of forward deployed combat forces, unit deployments, redeployments, relocations, deactivations and Air Force activities in general. This presentation provides a general understanding of the Air Force Second Destination Transportation program and its importance to Air Force operations, readiness and cost effective resource management. (Author)

15F. Nuclear Warfare

AD-A075 442/4 PC **A03/MF A01**
Army Command and General Staff Coll Fort Leavenworth Ks
Winning the Unthinkable War.
Research study,
Joseph B. Boyce, Jr. May 79, 34p

The purpose of this research study is to assess the strategic importance of Soviet civil defense in nuclear war. Based on unclassified information, this analysis contrasts US and Soviet views on nuclear war, examines Soviet war-survival preparations, and identifies some implications of these programs. Finally, recommendations for maintaining the strategic balance are presented.

AD-A075 533/0 PC **A02/MF A01**
Army Command and General Staff Coll Fort Leavenworth Ks
The Neutron Bomb - A Credible Deterrent.
Research study,
Vincent L. Bristow. May 79, 18p

Describes neutron bomb, its effectiveness and why the weapon should be considered a credible deterrent force. (Author)

15G. Operations, Strategy, and Tactics

AD-A075 248/5 PC **A07**/MF **A01**
Naval Postgraduate School Monterey Ca
An Air to Ground and Ground to Air Combined Arms Combat Simulation (STAR-AIR).
Master's thesis,
William John Caldwell , and William Daniel Meiers. Sep 79, 133p

This thesis presents a stochastic simulation model of ground to air and air to ground combat within the combined arms ground combat environment. The tactics represented, model capabilities and input requirements are explained in detail. A simulated battle is presented with a detailed explanation of the output to enable the reader to appreciate the potential applications of the model. This model represents an expansion of STAR, 'Simulation of tactical Alternative Responses', developed by Wallace and Hagewood (Ref. 15) to include air and air defense play. (Author)

AD-A075 358/2 PC **A06**/MF **A01**
Exercise Desert Rock 7th and 8th Camp Irwin Ca
Report of Test Infantry Troop Test Exercise DESERT ROCK VII and VIII.
Final rept.
11 Dec 57, 125p

In view of the experience gained at Exercise DESERT ROCK VII and VIII, it is imperative that the Army make every effort to obtain a maneuver site and low-yield tactical weapons to be utilized by an Army Commander to train troops and test atomic tactical doctrine without the inhibiting restrictions imposed by technical testing and instrumentation therefor. The goal would be to train and test units of at least the size of a Battle Group, supported by small yield atomic weapons.

AD-A075 407/7 PC **A06**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria Va
Behavioral Forecasting for Realtrain Combined Arms.
Interim rept.,
Steven M. Medlin. May 79, 119p Rept no. ARI-TP-365

The feasibility of board war gaming as a forecasting technique was investigated to determine behavioral benchmarks against which unit performance in engagement simulation (ES) exercises could be compared. Using the Fort Carson Forecasting Game, board exercises identical to REALTRAIN engagement simulation field exercises were conducted. Results indicated a few small differences between the two types of data; in general, however, the data from field and board exercises were comparable. This initial research effort to develop a feasible behavioral forecasting procedure for unit performance in engagement simulation exercises indicates that board war gaming has potential to meet these needs. (Author)

AD-A075 411/9 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria Va
A Partial Validation of Forecast Engagement Simulation Exercise Outcomes.
Interim rept.,
Steven M. Medlin. Aug 79, 29p Rept no. ARI-TP-382

The research evaluated the validity of board war gaming as a forecasting technique to determine behavioral benchmarks. Using data from the Combined Arms Test at Fort Carson, Colo., March 1978, and from the Fort Carson Forecasting Game, military judges were asked to distinguish between field exercise data and forecast data. Judgments were made on maps of exercise maneuver routes and tables summarizing data on casualties suffered and weapon systems inflicting casualties. The military judges were not able to distinguish between field and forecast maneuver routes, and they tended to classify forecast casualty data as field exercise casualty data. Board war gaming provides realistic process and product data that cannot be distinguished from field exercise data. Although further validation research needs to be conducted, board war game forecasting has great potential for use in developing performance benchmarks against which unit performance can be compared. (Author)

AD-A075 428/3 PC **A03**/MF **A01**
Human Resources Research Organization Alexandria Va
A Comparison of Speed and Accuracy of Interpretation of Two Tactical Symbologies.
Technical rept. 13 May-29 Dec 78,
Peter W. Hemingway , and Albert L. Kubala. Jul 79, 36p HUMRRO-FR-WD-TX-78-17, ARI-TR-389 Contract MDA907-78-C-2017

This report compares the speed and accuracy of interpretation of two tactical symbologies. One set of symbols was the standard set described in U.S. Army Field Manual 20-30. The other set was designed of the basis of previous research in symbology. A brief battle scenario was selected and for each symbol set 35mm slides were prepared representing updates in a tactical display. Results showed that (a) accuracy of interpretation did not vary between the sets, (b) the author-designed set was interpreted more rapidly, and (c) female participants were more rapid in interpreting the displays than male participants. (Author)

AD-A075 495/2 PC **A07**/MF **A01**
Army Infantry School Fort Benning Ga
Combat Operations Handbook.
2nd edition.
1964, 135p

This handbook is designed to provide a ready reference for use by students at the United States Army Infantry School and in future assignment.

AD-A075 504/1 PC **A05**/MF **A01**
Army Infantry School Fort Benning Ga
Pathfinder Handbook.
May 67, 82p

This manual is designed to provide a ready reference concerning the organization, training, and employment of TOE pathfinders units and unit terminal guidance personnel. This handbook outlines the procedures used by pathfinder units during various types of operations. These procedures may also be used by unit terminal guidance personnel.

AD-A075 505/8 PC **A11**/MF **A01**
Army Infantry School Fort Benning Ga
Army Airmobility Handbook.
Mar 67, 243p
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This Handbook incorporates guidance, doctrine and tactics required to plan and execute airmobile operations. It is specifically designed for resident and extension course students of the United States Army Infantry School to provide the student with a knowledge of how to apply the Army Airmobility Concept to enhance land combat effectiveness. This handbook deals with all aspects of airmobile operations, emphasizing the tactical employment of light observation (LOH), utility, and medium helicopters, both transport and armed. It also covers, in lesser detail, the tactical employment of heavy cargo helicopters, fixed wing aircraft, and organizations and equipment associated with Army aviation. It provides basic and general information, and detailed information where required, providing the student with the necessary background to plan and conduct airmobile operations from small patrol to brigade-size. Users of this Handbook are encouraged to submit recommended changes or comments for improvement. Comments should be forwarded to Director, Brigade and Battalion Operations Department, United States Army Infantry School, Fort Benning, Georgia 31905. (Author)

AD-A075 571/0 MF **A01**
Army Infantry School Fort Benning Ga
Lessons Learned (Vietnam).
1966, 566p
Availability: Document partially illegible.

This report presents a digest of the substantive comments of observers and commanders in operations and exercises emphasizing lessons learned and correlating those where appropriate to pertinent references in current training publications. Many lessons learned are being derived from operations in Vietnam, major field exercises, and other pertinent sources. These cite actions both correctly and incorrectly taken. The majority of the lessons are already clearly stated in current doctrine and techniques. Where they are not, they usually involve refinements peculiar to a particular area or situation.

PB80-801111 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Insurgency and Counterinsurgency in Military Affairs (A Bibliography with Abstracts).
Rept. for 1964-Oct 79,
Edith Kenton. Nov 79, 257p
Supersedes NTIS/PS-78/1020, NTIS/PS-77/0901, NTIS/PS-76/0792, NTIS/PS-75/701, and NTIS/PS-75/004.

The bibliography contains selected references dealing with the theory, methods, the planning, and operations of insurgency and counterinsurgency. Many of the citations concern military missions and activities in Southeast Asia, and communist inspired revolutionary movements in the Middle East, Africa, China and South America. (This updated bibliography contains 250 abstracts, 6 of which are new entries to the previous edition.)

16. MISSILE TECHNOLOGY

16A. Missile Launching and Ground Support

AD-A075 509/0 PC **A04**/MF **A01**
Air Force Occupational and Environmental Health Lab Brooks AFB Tx
Baseline Acoustic and Vibration Study of the Minuteman II. (Integrated Program) Launch Control Center, WS-133B (IP).
Technical rept.,
Nick A. Farinacci. Jan 79, 60p Rept no. OEHL-79-10

This report presents baseline acoustic and vibration data acquired in a Minuteman(II) (Integrated Program) Launch Control Center (WS-133B). No hazardous levels for exposures of up to 24-hour duration were found. Recommendations are provided to reduce the levels compatable with an environment suitable for long-duration crew alerts. (Author)

17. NAVIGATION, DETECTION, COMMUNICATIONS, AND COUNTERMEASURES

17A. Acoustic Detection

AD-A075 131/3 PC **A04**/MF **A01**
Naval Ocean Systems Center San Diego Ca
Phase Integral Algorithms for Signal Speeds in Range-Dependent Sound Velocity Profiles.
Final rept. Jan-Jul 78,
R. C. Shockley. 10 Jul 78, 51p Rept no. NOSC/TR-412

This report presents two Fortran raytracing codes and related theory which are designed to treat underwater sound propagation in the presence of range-dependent sound velocity profiles (SVPs). Particular emphasis is placed on the average horizontal ray velocity and its variation as a ray traverses different SVPs. Efficient calculation of this variation is of great importance for improved modern multisensor localization techniques. The adiabatic invariant approximation agrees well with exact raytracing results even for strongly inhomogeneous sound velocity profiles. Simple algorithms are developed for demonstrating this and for computing the adiabatic invariant in arbitrary profiles for a user-selected family of rays.

AD-A075 162/8 PC **A05**/MF **A01**
Coast Guard Research and Development Center Groton Ct
Underwater Search Using Side Scan Sonar.
Final rept.,

Walter B. Lincoln. Jan 79, 91p CGR/DC-2-79, USCG-D-08-79

This is a manual of instruction for using the side scan sonar system in searching for underwater objects, to be used in conjunction with standard search manuals, such as the National Search and Rescue Manual (CG 308) and the manufacturers' instruction book. The general approach is twofold. The first is to present logical search methods for conducting a broad area search using a sensor such as a side scan sonar. The second is to present objective methods of interpreting side scan sonar images of objects on the seafloor by the operator. Side scan sonar records of four specific targets are presented in an interpretive portfolio to enable assessment of the sonar system's capability and to train unskilled operators. The four targets are: a small single engine aircraft, an automobile, a 40-ft. steel boat and a Coast Guard buoy. Two cases of opportunity involving sunken vessesl are presented. (Author)

AD-A075 557/9 PC **A05**/MF **A01**
Little (Arthur D) Inc Cambridge Mass
Reverberation Spectrum Prediction Model. Volume I.
Summary rept. on Phase 2.
May 69, 91p Rept no. ADL-5210569
Contract N00140-67-C-0265

Contents: The Reverberation Model; Geometrical Spreading Loss-General; Details of Propagation Loss Calculation; The Timer Algorithm; Arrays and Doppler Broadening Calculations; and Reverberation Spectrum Computation.

17B. Communication

AD-A075 093/5 PC **A13**/MF **A01**
Bolt Beranek and Newman Inc Cambridge MA
Development of a Voice Funnel System: Design Report.
Rept. for 15 Jul 78-31 Jul 79,
R. Rettberg, C. Wyman, D. Hunt, M. Hoffman, and P. Carvey. Aug 79, 294p Rept no. BBN-4098
Contract MDA903-78-C-0356, ARPA Order-3653

This report presents the current design of the Voice Funnel System, a high speed concentrator for packet switched speech and other streams of packetized data. The design is based on a multiprocessor architecture implemented using a novel switching network, the Butterfly Switch. (Author)

AD-A075 098/4 PC **A04**/MF **A01**
Rome Air Development Center Griffiss AFB Ny
Spread-Spectrum Data Link Test Facility,
Oscar H. McKee. Aug 79, 53p Rept no. RADC-TR-79-244

This technical report describes the development of an in-house capability for evaluating wide bandwidth spread spectrum modems. The major portion of the report concerns the development and fabrication of the microwave transmitting and receiving equipment used during the flight testing of a direct sequence spread spectrum modem developed to RADC specifications. The microwave equipment developed for the test facility operated at an IF of 300 MHz, with four distinct RF frequencies of 4500 MHz, 4900 MHz, 7350 MHz and 7900 MHz. The output power for all stations was set at 200 watts CW, however, additional power is available at the three ground stations. Section 2 of the report presents the theoretical calculations used to predict the maximum range expected from each of four data links incorporated in a five station test scenario. The maximum theoretical range was calculated to be 414.3 miles, however, the ranges achieved during actual flight testing were approximately 9 dB below theoreteical expectations.

AD-A075 178/4 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Communications Computers,
Marian Molski. 10 May 79, 16p Rept no. FTD-ID(RS)T-0540-79
Edited trans. of Informatyka (Poland) n5 p17-19 1977, by F. Zaleski.

No abstract available.

AD-A075 195/8 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Data Transmission Equipment,
V. I. Denisov , and V. A. Pavlov. 7 Dec 78, 19p Rept no. FTD-ID(RS)T-2063-78
Edited trans. of Avtomatika Telemekhanika i Svyaz' (USSR) n1 1973, by Martin J. Folan.

No abstract available.

AD-A075 211/3 MF **A01**
Delta Information Systems Inc Jenkintown Pa
Development of a Computer Program for Measuring the Compression and Error Sensitivity of Facsimile Coding Techniques.
Final rept.,
Richard Schaphorst , Dennis Bodson , Steve Urban , and Neil Randall. 10 Aug 79, 98p NCS-TIB-79-8, AD-E100 280
Contract DCA100-79-M-0105
Availability: Microfiche copies only.

This Technical Information Bulletin (TIB) describes the development of computer programs to measure compression and error sensitivity of facsimile coding techniques. (Author) The Modified Huffman code (one-dimensional) was used as the vehicle to check the validity of the computer programs. Future TIBs will describe computer programs and results obtained on candidate CCITT two-dimensional coding techniques. (Author)

AD-A075 286/5 PC **A06**/MF **A01**
E-Systems Inc St Petersburg Fl ECI Div
Electronically Tuned UHF Receiver Preselector.
Final technical rept. 27 Oct 77-30 Oct 78,
Thomas Swanson. Aug 79, 105p RADC-TR-79-210
Contract F30602-77-C-0200

This report describes design and construction of a prototype improved electronically tunable UHF receiver preselector for interference reduction in Air Force communication systems. This research work was directed toward developing the technology for frequency agile preselectors to protect solid state receivers from high level signals originating from colocated UHF transmitters. The design approach consists of tuning a modified comb-line filter structure with high Q UHF capacitors and pin diode switches. Equations and design considerations are given for construction of tuning networks which have Cx2 to the Nth power binary capacitance steps. A computer program was used to predict the filters performance based on the values of stray capacitance and inductance of the tuning networks. The tuning networks were then optimized which ensured that spurious resonances fell well outside of the tuning range of the filters. The filters were built based on these computer modeled results. Test data showed input VSWR variation versus the tuning frequency of the filters. These changes were found to be caused by variation in current loading at the tap point of the resonator resulting from the different values of capacitance selected in the tuning network. Improved filter performance was obtained by grounding the input transformers in the vicinity of the tuning network tap point.

AD-A075 306/1 MF **A01**
Transportation Systems Center Cambridge Ma
National Voice Response System (VRS) Implementation Plan Alternatives Study.
Final rept. Aug 78-Feb 79,
M. Medeiros , I. Englander , H. Glynn , J. Richards , and J. Sigona. Jul 79, 211p TSC-FAA-79-15, FAA-RD-79-85
Availability: Microfiche copies only.

This study examines the alternatives available to implement a national Voice Response System (VRS) for automated preflight weather briefings and flight plan filing. Four major hardware configurations are discussed. A computerized analysis model was developed and used to determine relative merits, costs, and sensitivities of key factors such as centralized vs. decentralized networks, demand levels, average call duration, partial implementation, fail-soft operations, WATS vs. FX telephone service, VRS channel sizing and projected demand growth. The study shows that excessive communication costs predominated the centralized configuration alternatives. The minimum cost system, which is also the recommended one, is a distributed processor configuration with 20 Data Base Processor sites and 134 VRS sites. (Author)

AD-A075 321/0 PC **A04**/MF **A01**
SRI International Menlo Park Ca
User's Manual for NUCOM III. An HF Nuclear Effects Code Incorporating WEPH VI-Mod 1.
Topical Rept. Dec 76-Nov 78,
Jacqueline Owen , and Karen K. Bailey. 30 Nov 78, 65p DNA-4824T, AD-E300 597
Contract DNA001-77-C-0063

This report is a user's manual for NUCOM III, a computer code that predicts the magnitude and duration of nuclear weapon effects on the performance of HF communication systems. NUCOM III consists of five components: NATPAT, WEPH, ORDER, RAYTRA, and COMEFF. These components operate sequentially to: compute an ionospheric model representative of the natural ionosphere along a path; compute an ionospheric model that accounts for the nuclear effects on the ionosphere along a path; include mechanical wave effects on the ionosphere; compute the characteristics of raypaths using a propagation model that does not restrict the type or number of raypaths that may exist; and combine the raypath characteristics at a frequency and time to obtain an estimate of the communication system performance. NUCOM III incorporates WEPH VI--Modification 1 as its second component; the previous version of NUCOM (NUCOM II) incorporated WEPH V--Modification 7. This report describes the changes made in the code to incorporate WEPH VI, and other modifications made in NUCOM since NUCOM II. (Author)

AD-A075 369/9 PC **A03**/MF **A01**
Naval Research Lab Washington Dc
Performance Studies of the Distributed CPODA Protocol in the Mobile Access Terminal Network.
Interim rept.,
Carl E. Landwehr. 28 Sep 79, 42p NRL-MR-4084, AD-E000 328

A Contention Based, Priority Oriented, Demand Access (CPODA) protocol has been proposed for use in a network of shipboard computers and terminals designed to provide access to the Advanced Command and Control Architectural Testbed (ACCAT) via ARPANET. A model of the protocol was implemented on NRL's Satellite Communication Simulator and performance studies were conducted. Although delays in the network are likely to exceed levels tolerable in a shore-based communications network for interactive computer use, they may be acceptable for the purposes of the project. (Author)

AD-A075 408/5 PC **A02**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria Va
Listening to Compressed Speech: The Effects of Instructions, Experience, and Preference.
Technical paper,
Paul A. Gade , and David Gertman. Aug 79, 22p Rept no. ARI-TP-369

This experiment attempted to assess the effects of different information- seeking strategies on the rate at which individuals chose to listen to passages of time-compressed speech, and on their comprehension of those passages. The research also assessed the effects of prior experience with compressed speech on listning rates and on comprehension of 48 Army enlisted men and women. The various information-seeking strategies employed, produced no significant differences in speed or accuracy of performance. Personnel preferred to listen to speech rates well above normal speaking rates.

AD-A075 446/5 PC **A09**/MF **A01**
ARINC Research Corp Annapolis Md
Feasibility Study of DCS Palletization/Modularization Concept,
W. J. Hodin , L. Graham , J. S. Schaefer , and A. Simmons. Jul 79, 177p 1086-01-1-1939, AD-E100 292
Contract DAEA18-72-A-0005
See also Annex A, AD-A075 447.

The basic feasibility, probable scope, implications, and costs of implementing the Defense Communications System palletization/modularization concept are examined in the context of requirements for the worldwide present and future (1980's) DCS

and the applicable capabilities, techniques, and technologies. Source materials for the study included relevant military documents, program reports and plans, and industry literature surveys, supplemented by visits to selected organizations and representative facilities. (Author)

AD-A075 447/3 PC **A03**/MF **A01**
ARINC Research Corp Annapolis Md
Feasibility Study of DCS Palletization/Modularization Concept. Annex A. Technical Design Handbook,
W. J. Hodin , L. Graham , J. S. Schaefer , and A. Simmons. Jul 79, 36p 1086-01-1-1939-ANNEX-A, AD-E100 293
Contract DAEA18-72-A-0005
Annex A to report dated Jul 79, AD-A075 446.

The basic feasibility, probable scope, implications, and costs of implementing the Defense Communications System palletization/modularization concept are examined in the context of requirements for the worldwide present and future (1980's) DCS and the applicable capabilities, techniques, and technologies. Source materials for the study included relevant military documents, program reports and plans, and industry literature surveys, supplemented by visits to selected organizations and representative facilities. (Author)

AD-A075 467/1 PC **A09**/MF **A01**
ITT Electro-Optical Products Div Roanoke Va
Bi-Directional Coupler for Full Duplex Transmission on a Single Fiber.
Final rept. 1 May 77-15 May 79,
A. R. Nelson , G. A. Gasparian , and G. W. Bickel. Aug 79, 190p CORADCOM-77-1798-F
Contract DAAB07-77-C-1798

The primary objective of this contract is the development of a bi-directional coupler for single optical fiber transmission systems and the implementation of two such couplers in a full duplex link with simulated length of up to 8 km, 20 Mb/s data rate, and 10 to the -8th power BER. The primary approach adapted for this task is the fiber dichroic coupler. Other approaches were also investigated. When used in a duplex optical data link, this three port device constitutes a wavelength selective bi-directional coupler. (Author)

AD-A075 489/5 PC **A04**/MF **A01**
Northeastern Univ Boston Mass Electronics Research Lab
FM Transmission of Television from Rockets and Balloons.
Interim rept.,
Willard F. Thorn. 11 Jul 79, 57p SCIENTIFIC-3, AFGL-TR-79-0160
Contracts F19628-76-C-0111, F19628-76-C-0152

This report deals with the use of preemphasis filtering in FM transmission of television. The television cameras and transmitter are to be located on rocket or balloon instrumentation payloads. The large RF bandwidth necessary for television transmission requires a large transmitted power for the distances of interest. The use of preemphasis will reduce the required transmitted power considerably below that required for a picture of similar quality without preemphasis. This thesis shows how preemphasis filtering can provide an improvement and what the limits of these improvements are. (Author)

AD-A075 499/4 PC **A05**/MF **A01**
Naval Postgraduate School Monterey Ca
An Application of Rule-Directed Interactive Transaction Agent (RITA) for the Automated Technical Control of the Defense Communications System (DCS).
Master's thesis,
Mark Howard Smith. Jun 79, 86p

Historically, military technical control facilities (TCF) have performed their supervisory and control functions over communications-electronics systems by manual processes, using verbal and/or teletype conversations for coordinating with distant stations. These methods will soon be changed with the application of computers to automate many of the manual tasks and assist the technical controllers in others. One of these manual tasks, that of record-keeping and report generation, promises to yield significant manpower savings but has been deferred from implementation due to high cost and technical complexity. Accordingly, this thesis proposed a representative software program for an automatic report generator using the Rule-directed Interactive Transaction Agent (RITA). It facilitates the automatic entry of data into reporting formats, automatic generation of data into files/reports, a capability to alter report formats and file building rules, and algorithms for automated statistical analysis of data files.

AD-A075 502/5 PC **A02**/MF **A01**
Ohio State Univ Columbus Electroscience Lab
Communication Application of Adaptive Arrays.
Quarterly rept.,
R. T. Compton, Jr. Sep 69, 8p Rept no. ESL-711847-3
Contract N00019-79-C-0291

This report describes progress under Naval Air Systems Command Contract N00019-79-C-0291 during the second quarterly period. Research on adaptive arrays for communication applications is summarized. (Author)

AD-A075 601/5 PC **A18**/MF **A01**
Army Infantry School Fort Benning Ga
Infantry Communication Data.
Jan 68, 412p
Supersedes report dated Jul 67. See also report dated Jan 69, AD-A074 149.

No abstract available.

N79-32254/1 PC **A04**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Technology Div.
Military Satellite Communications, History and Status as of 1974.
J. P. B. Vreeburg. Apr 79, 72p NRL-TR-74173-U
Subm-Sponsored by Directorate of Material Air, Rnlaf.

After a short introduction to various types of links and network organizations, the experimental phase in military satellite communications systems is described in a chronological discussion of early communications satellites. This experimental phase is considered to have ended with the TASCAT and IDCSP satellites. Present systems and systems of the near future are covered in subsequent sections. Technological and operational state of the art is highlighted in connection with orbits, launchers, satellite and earth terminal systems, and multiple access techniques. A special section is devoted to features concerning the vulnerability of satcom systems and intends to show that one may well expect such vulnerability to be less than for traditional systems. Extensive references to detailed discussions of various problems connected with military satcom are provided from a list of easily accessible literature.

N79-32410/9 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Technical Assistance for Law-Enforcement Communications: Case Study Report Two.
N. B. Reilly, and J. A. Mustain. 15 Aug 79, 33p NASA-CR-162294, JPL-PUB-79-78
Contract NAS7-100
Subm-Sponsored in Part by LEAA.

Two case histories are presented. In one study the feasibility of consolidating dispatch center operations for small agencies is considered. System load measurements were taken and queueing analysis applied to determine numbers of personnel required for each separate agency and for a consolidated dispatch center. Functional requirements were developed and a cost model was designed to compare relative costs of various alternatives including continuation of the present system, consolidation of a manual system, and consolidated computer-aided dispatching. The second case history deals with the consideration of a multi-regional, intrastate radio frequency for improved interregional communications. Sample standards and specifications for radio equipment are provided.

N79-32411/7 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Technical Assistance for Law-Enforcement Communications: Grant Summary.
N. B. Reilly. 15 Aug 79, 40p NASA-CR-162305, JPL-PUB-79-84
Contract NAS7-100
Subm-Prepared for LEAA.

A summary overview of project activities and results are presented. The goals and objectives are reviewed and a description of the approaches used to attain them is given. The feedback received from the seminars conducted as part of the project, and results from a questionnaire about the project are included. Significant findings of the project in such areas as radio channel loading, dispatch system design, training and technology transfer are discussed. Several specific problem areas are identified and evaluated. Specific recommendations for future technical assistance efforts are presented along with an inventory of technical-assistance reports generated throughout the project.

N79-32445/5 PC **A05**/MF **A01**
Dornier-System G.m.b.H., Friedrichshafen (Germany, F.R.). Hauptabt. Raumfahrtprogramme.
Simulation of Communications Systems for TV Transmission, Exchange of Radio Programs, and Long-Distance Telephony.
Final Report.
W. Kriegl, H. Loehle, and U. Wolff. Dec 78, 91p BMFT-FB-W-78-27
Contracts BMFT-WRT-1075, DFVLR-BPT-01-YC-015
In German; English Summary.

A FORTRAN 4 computer program for the simulation of the implementation of a communications system for telephony, data transmission, exchange of television programs with or without radio, and community reception of TV for any country in the world is presented. The simulation program compares for a desired coverage area implementations by means of communication satellites and or long distance terrestrial networks. Besides the most important technical date, the program furnishes a cost analysis so that a cost optimal system can be found. Thus the simulation program can be regarded as an objective decision making tool for the implementation of communication systems. In order to obtain meaningful results from the simulation program a detailed preparation of the inputs is necessary. For this, whenever possible, exact population statistics to provide a complete traffic model are used. The structure of the program is such that some subsystems are automatically optimized by the computer and the complete optimal solution can be obtained by variation of the input parameters in several simulation runs.

N79-32446/3 PC **A03**/MF **A01**
National Physical Lab., Teddington (England). Div. of Computer Science.
The CONCLAVE Computer Teleconferencing System.
M. Dowson. May 78, 32p NPL-COM-107

These facilities make it possible for a number of geographically separated participants to take part in a discussion using visual display terminals connected to the host computer via a communications network. The structure of CONCLAVE, including entry, reception of messages and display of CONCLAVE records, generating a contribution or message, and control (the chairman's facilities) are discussed. Experiments with CONCLAVE are listed and results examined, notably the European Information Network demonstration. Finally, the software behind CONCLAVE is explained and some CONCLAVE display formats are shown.

N79-32448/9 PC **A08**/MF **A01**
Siemens A.G., Munich (Germany, F.R.). Forschungslaboratorien.
Optimization of Future Telecommunication Network Structures.
Final Report.
M. Mrva, and R. Nocker. Dec 78, 163p BMFT-FB-T-78-55
Contract BMFT-NT-0630
In German; English Summary.

The structure of communication networks was examined in order to determine the suitability for providing new services. The impact of recent ad-

vances in telecommunications technology was also taken into consideration. Network structures are classified by means of graph theory, their properties are discussed, and new structures are compared with those being used nowadays. Looking at local networks, special attention is directed towards time division multiplex systems with decentralized switching and multiplex access. Using models, comments on the integration of several services into one network are made. Computer programs as an aid for planning, especially for long distance networks, were developed. Features, such as reliability, permeance, vulnerability, line, cable and duct length, ability to extend the network, and economy were taken into account. The computer programs, also for graphic display dialogue, are listed at the end of the report.

N79-32450/5 PC **A03**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
Description of Stidas 2-C (Speech Transmission Index Device Using Artificial Signals). Part 1: General Description.
H. J. M. Steeneken, and E. Agterhuis. 1978, 27p IZF-1978-19, TDCK-71457

A physical method determining the quality of speech transmission channels vas developed. The method quantifies preservation of the intensity fluctuations of speech in a number of parallel frequency bands. From this a physical quantity can be derived which is related to the intelligibility of speech, the Speech Transmission Index. The approach was optimized for a great number of different communication channels with disturbances such as noise, peak clipping, bandpass limiting, and digital modulation methods. The hardware and software of the measuring are described.

N79-32451/3 PC **A03**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
A Physical Method for Measuring Speech-Transmission Quality.
H. J. M. Steeneken, and T. Houtgast. 1979, 30p IZF-1979-1, TDCK-71718

A physical method for measuring the quality of speech transmission channels was developed. Essentially, the method represents an extension of the articulation index concept which was developed mainly to account for distortions in the frequency domain (noise, bandpass-limiting). The underlying concept of the present approach, based on the modulation transfer function of a transmission channel, was adapted to account for nonlinear distortions (peak clipping) as well as for distortions in the time domain (reverberation, echoes, automatic gain control). The resulting index, the speech transmission index (STI) was correlated with subjective intelligibility scores obtained on 167 different transmission channels with a wide variety of disturbances. The relative predictive power of the STI, expressed in PB-word score, appeared to be 5%. This accuracy is comparable with results obtained from subjective measurements when about four talkers and four listeners are used. Expressed in terms of signal-to-noise ratio, the accuracy is about one dB. Pilot studies were carried out to evaluate the use of the STI for testing digital speech transmission channels.

N79-33373/8 PC **A02**/MF **A01**
Hughes Aircraft Co., Los Angeles, Calif. Space and Communications Group.
The 18 and 30 Ghz Fixed Service Communication Satellite System Study: Executive Summary.
Final Report.
L. M. Bronstein. Sep 79, 11p NASA-CR-159627-1, HAC-REF-E1992-1
Contract NAS3-21367

The use of the 18 and 30 GHz bands for fixed service satellite communications is examined. Primary objectives were to determine if satellite communication systems using this allocation (27.5 to 30.0 GHz uplink; 17.7 to 20.2 GHz downlink) can be cost competitive with alternate means of communication, and to determine what technological developments would be required to make these systems competitive. To meet these objectives, the cost and performance to be expected of 18 and 30 GHz hardware in the 1985 to 1990 era was assessed, selected trunking and direct to user concepts were optimized, and the cost of these systems was estimated. Finally, the technology developments required to make the most promising of the concepts competitive were identified.

N79-33374/6 PC **A13**/MF **A01**
Hughes Aircraft Co., Los Angeles, Calif. Space and Communications Group.
The 18 and 30 Ghz Fixed Service Communications Satellite System Study.
Final Report.
L. M. Bronstein. Sep 79, 297p NASA-CR-159627-2, HAC-REF-E1992-2
Contract NAS3-21367

The use of the 18 and 30 GHz bands for fixed service satellite communications is examined. The cost and performance expected of 18 and 30 GHz hardware is assessed, selected trunking and direct to user concepts are optimized, and the cost of these systems are estimated. The effect of rain attenuation on the technical and economic viability of the system and methods circumventing the problem are discussed. Technology developments are investigated and cost estimates of these developments are presented.

N79-33378/7 PC **A04**/MF **A01**
Communications Research Centre, Ottawa (Ontario).
Radio Noise Survey Procedures for a Communication Site: 0.15 - 30 Mhz.
W. R. Lauber, and C. J. Pike. Aug 79, 51p CRC-1325

A step-by-step plan for performing a radio noise survey at a communication site is provided. The data obtained in the survey are used to describe the radio noise environment at the site and may be used to see if a good site is deteriorating or a bad site is improving. The general plan allows for some variation, as each site is different, but is strict enough for compatible results. The measurement data is described as well as ways to analyze and use them in order to evaluate the site. Details for future reassessment are presented. Instructions on the use of basic data for communication system design and system performance prediction are given.

N79-33379/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Carrier: Interference Ratios for Frequency Sharing Between Satellite Systems Transmitting Frequency Modulated and Digital Television Signals.
S. P. Barnes. 1979, 8p NASA-TM-79265, E-180
Conf-to Be Presented at the Natl. Telecommun. Conf., Washington, D. C., 26-28 Nov. 1979; Sponsored by IEEE.

Results are presented of subjective and quantitative tests describing the results of interference to a particular digital television system from a frequency modulated (FM) television system, and for interference to an FM television system from a digital television system.

17D. Electromagnetic and Acoustic Countermeasures

AD-A075 157/6 PC **A05**/MF **A01**
State Univ of New York Coll at Oneonta Dept of Mathematical Sciences
Maximum Entropy Spectral Demodulator Investigation.
Final technical rept. Jun 77-Sep 78,
Robert Guy Van Meter. Aug 79, 98p RADC-TR-79-209
Contract F30602-75-C-0122

The work presented in this report examined the feasibility of using maximum entropy spectral estimation techniques for demodulating frequency shift keyed signals in the presence of interfering signals and noise. Conventional frequency shift keyed demodulators derive an output representative of the instantaneous frequency, an output which can take only a single value at any instant. Spectral estimation allows multiple values of discrete frequencies to be resolved simultaneously. The ability to resolve several values of discrete frequencies simultaneously opens up the way to simultaneous detection and demodulation of both the desired signal and the interference. Communication decisions can then be made for the desired signal on the basis of frequency, and interference can be detected, recognized, and ignored based upon frequency. This report examines this demodulator capable of obtaining 15 to 20 decibels of interference rejection appears to be feasible given that the state of the art in analog to digital converters is 16 binary digits.

17E. Infrared and Ultraviolet Detection

AD-A075 103/2 PC **A03**/MF **A01**
Defence Research Establishment Valcartier (Quebec)
Optimisation et Evaluation d'un Systeme D'Alarme D'Intrusion Infrarouge (Optimization and Evaluation of an Infrared Intrusion Alarm System),
B. Montminy. Feb 78, 34p Rept no. DREV-4073/78
Text in French; abstract in English.

A passive infrared intrusion alarm system was modified and evaluated for its effectiveness to detect the presence of an intruder in a restricted area. the system consisted of an optical head gathering the infrared radiation coming from surrounding objects and their background onto a pyroelectric detector by means of a rotating and spherical focussing mirrors. The optical head was connected to an electronic circuit which compared successive scans to detect any significant changes in the collected radiation.

AD-A075 265/9 PC **A04**/MF **A01**
Georgia Inst of Tech Atlanta Engineering Experiment Station
Investigation of Millimeter Wave and Far Infrared Multiwavelength Systems.
Final rept. 1 Jul 77-31 Mar 79,
R. G. Shackelford , J. J. Gallagher , R. W. McMillan , G. R. Loefer , and W. M. Penn. 17 Sep 79, 68p GIT/EES-A-1985, ARO-15277.2-A-P
Contract DAAG29-77-C-0026

This report summarizes the results of three related tasks performed under the subject contract: Hybrid Millimete Wave/CO2 Laser Target Acquisition System; Millimeter Wave Propagation Through Battlefield Dust; and Report of NMMW System Subpanel. A full final report has been published on each subtask, and is available through the cognizant Army Organizations. (Author)

AD-A075 275/8 PC **A04**/MF **A01**
Sri International Menlo Park Ca
Lidar Observations at 0.7-micrometers and 10.6-micrometers Wavelengths During Dusty Infrared Test I (DIRT-I).
Technical rept.,
Jan E. van der Laan. Sep 79, 60p SRI-TR-3, ERADCOM/ASL-CR-79-0001-2
Contract DAAG29-77-C-0001

This technical report describes lidar measurements and results using 10.6-micrometers lidar and the SRI Mark IX (0.7-micrometers) lidar systems during the Dusty Infrared Test-I (DIRT-I). Transmission comparisons are made between the two wavelengths with artillery barrages, TNT explosions, and oil/rubber fire-generated dust and smoke clouds in a test zone midway (1 km) along the lidar path. A target at the end of the lidar path provided a reference backscatter return for the transmission measurements. Backscatter properties of the dust and smoke clouds are also discussed. Results of the DIRT-I program indicate that the broad particle size distribution present in the dust generated produced little if any wavelength dependent transmission effects. The few observed exceptions where greater 10.6-micrometers transmission is indicated generally can be explained by the presence of wavelength-dependent smoke along the optical path, which is also generated by the detonations. Backscatter-to-transmission relationships are grossly related but, in general, are quite nonlinear, as can be expected when multiple and specular scatter by the large particles, as well as strong attenuations, are involved. The

oil/rubber fire generated dense black smoke that was totally opaque to the 0.7 micrometers lidar, while the 10.6 micrometers transmission measurements indicate a transmission of approximately 6%.

AD-A075 603/1 PC **A03**/MF **A01**
Electro-Optical Technology Program Office (Navy), Washington, DC.
Passive Infrared Surveillance. Part I: Model Formulation.
Interim rept.,
Richard A. Steinberg. 28 Sep 79, 43p EOTPO-52, NRL-8320

A new theoretical procedure is presented for calculating the performance of scanning background limited (BLIP) infrared sensors with adaptive threshold signal-processing logic. The performance predictions obtained with this model are background-conditional, i.e., are valid only for a given infrared background scene, presumably specified as a radiance map of arbitrary (but deterministic) structure. The nonstationary statistical nature of the photocurrent is explicitly taken into account. The basic approach involves a combination of some results from optical communications theory with a formalism for the threshold-crossing statistics of nonstationary noises. The present work is pursued further in a companion paper in which various simplifying approximations and illustrative numerical examples are presented. The theory developed in these two papers is directly applicable to design parameter trade-off studies for infrared search and track (IRST) devices.

N79-32532/0 PC **A03**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
A Photoconductive Detector for the Middle Infrared.
Final Report.
K. U. Grossmann, U. Hirt, and D. Offermann. Dec 78, 43p BMFT-FB-W-78-32
Contracts BMFT-WRT-1075, DFVLR-BPT-01-OO-015-A
In German; English Summary.

Fabrication and tests of various copper doped germanium photoconductors are described. In addition to the expected response of these detectors at wavelengths below about 30 micrometers due to the copper doping, most of the tested detectors exhibit a high sensitivity at wavelengths up to 200 micrometers. These results were used to obtain a broadband photoconductive detector the sensitivity of which shown to extend from approximately 5 micrometers to 200 micrometers.

17G. Navigation and Guidance

AD-A075 208/9 PC **A20**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Principles and Operational Aspects of Precision Position Determination Systems,
Cornelius T. Leondes. Jul 79, 475p Rept no. AGARD-AG-245

Contents: The Global Positioning System, The Joint Tactical Information Distribution System.

AD-A075 271/7 PC **A07**/MF **A01**
Massachusetts Inst of Tech Cambridge Experimental Astronomy Lab
Position Indication at Sea by Astro-Photogrammetry,
A. C. Conrod. Nov 63, 131p Rept no. RE-5
Contract N62306-1168
Errata sheet inserted.

The Experimental Astronomy Laboratory of the Massachusetts Institue of Technology, acting under U.S. Naval Oceanographic Contract has prepared a study of a method of locating a ship at sea by astro-photogrammetric methods. The system described in this report is a surveying instrument and not a navigational device. It consists of an inertially stabilized photo theodolite with which one can accurately locate aids to navigation and make geodetic observations from a ship at sea. Like all direct-observation surveying techniques, good observational weather is required for its use, and results are only available after data processing.

AD-A075 283/2 PC **A03**/MF **A01**
Virginia Polytechnic Inst and State Univ Blacksburg Dept of Engineering Science and Mechanics
Response of Slightly Damped Gyroscopic Systems,
L. Meirovitch , and G. Ryland, II. 1979, 41p
Contract N00014-78-C-0194

A second-order perturbation theory is developed for the response of slightly damped gyroscopic systems. The solution is based on the Eigensolution for undamped gyroscopic systems and is expressed in terms of real quantities alone. (Author)

AD-A075 290/7 PC **A06**/MF **A01**
Facility Checking Squadron (1866th) (AFCS) Scott AFB Il
TRACALS Evaluation Report. SSILS Initial Evaluation Report, Bitburg AB, Germany, 13 - 27 July 1979,
Harvey J. Leister. 15 Oct 79, 108p Rept no. 79/66N-182

This report presents the results of the 13-27 July 1979 TRACALS evaluation of the Bitburg AB AN/GRN-27 SSILS. The evaluation was conducted to determine the capabilities and limitations of the system in its installed environment. Results presented in this report can be used as a guide to anticipated performance until there is a significant change in ground equipment, siting environment, screening or operational use. (Author)

AD-A075 352/5 PC **A03**/MF **A01**
Federal Aviation Administration Washington Dc Office of Systems Engineering Management
Report of the FAA Task Force on Aircraft Separation Assurance. Volume I. (Revised). Executive Summary,
Neal A. Blake , Edmund Koenke , Leland Page , and Martin T. Pozesky. Jan 79, 38p Rept no. FAA-EM-78-19-VOL-1-REV.
Revision of Report dated Dec 78, AD-A067 905.

A task force has developed FAA Engineering and Development consensus on the integrated aircraft separation assurance system for the National Airspace System. This report details a study of system errors, mid-airs, and near mid-airs to define the problem. The system element requirements are defined to provide two levels of backup to the ATC system: a separation violation warning and a final fail safe collision advisory and resolution function. The current FAA ASA development programs are discussed and the changes are detailed which are required to transition to an integrated ASA system. This report consists of three volumes. Volume I is the Executive Summary with an overview of the work performed by the Task Force. Volume II is the detailed main concept descripton delineating the required systems and interfaces. Volume III includes appendices, referred to in the main report, which define in detail the specific interfaces and designs required for system integration. (Author)

AD-A075 395/4 CP **T04**
Coast Guard Washington DC
Propagation Correction (PPC) Model Computer Program.
Model Simulation,
Peter B. Morris, Larry L. Stabler, and Lloyd L. Anderson. Sep 79, mag tape DOT/DF-79/003
Magnetic Tape.
Source tape is in EBCDIC character set. Tape(s) can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density and parity. Call NTIS Computer Products if you have questions. $250.00 Price includes documentation, AD-A008 424.

This FORTRAN source program consists of a driver and eight subroutines. Inputs to the program are receiver position (geodetic), time(year, month, day, hour, minute), OMEGA transmitting stations and frequency. Output is a propagation correction (PPC) for each transmitting station and a PPC for the phase (path) difference. The program is an updated (for 10.2 kHz) and slightly revised version of an earlier program indexed as AD-A017 481. Except for these minor modifications, the program is thoroughly documented in the report 'OMEGA Propagation Corrections: Background and Computational Algorithm'-Morris, P. and Cha, M., ONSOD 01-74, AD-A008 424.

AD-A075 434/1 PC **A03**/MF **A01**
Army Missile Command Redstone Arsenal Al Technology Lab
Size Effect on Navigation Using a Strapdown IMU.
Technical rept.,
J. C. Hung , J. S. Hunter , W. W. Stripling , and H. V. White. 27 Jun 79, 29p Rept no. DRSMI-T-79-73

Size effects in a strapdown IMU (Inertial Measurement Unit) are not always ignorable. They should be considered in the error budget for high accuracy inertial navigation. This report presents results of a study on size effects. It is found that while each individual accelerometer has only one type of size effect, an IMU has two in general, the 'mounting offset size effect' and the cluster size effect. General formulas for determining IMU size effect errors are developed in the report. Numerical examples, laboratory test results, and flight simulation results are given to demonstrate the size effects and to reveal their effect on navigation error. It is discussed that an optimum orientation for the accelerometer cluster can be chosen to minimize the navigation errors caused by size effects. It is also shown that, in principle, size effect of an IMU can be compensated using the angular rate information available from gyros. A size effect compensation concept is proposed with the associated computation algorithm given. (Author)

AD-A075 484/6 PC **A12**/MF **A01**
Champlain Technology Industries Palo Alto Calif
Airborne Evaluation of the Production An/ARN-133 Loran-C Navigator.
Final rept.,
Richard J. Adams , and John B. McKinley. Jul 79, 271p USCG-D-32-79
Contract DOT-FA75WA-3662
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This report presents the results of a comprehensive flight test evaluation of a production airborne Loran-C navigator. The test were performed on a FAA approved helicopter route in the Northeast Corridor, at NAFEC in Atlantic City, New Jersey and in the Gulf of Mexico. The test aircraft used were United States Coast Guard HH52 and HH53 helicopters. The test period was from June 1978 to January 1979. The test plan and test objectives were developed jointly by the United States Coast Guard and the Federal Aviation Administration and Systems Control, Inc. (Vt), Champlain Technology Industries Division. The flight test profiles and procedures were developed for the following reasons: (1) to assess the ACceptability of Loran-C navigation in the operational ATC environment of the Northeast Corridor; (2) to determine the system use accuracy for Loran-C for enroute, terminal and non-precision approach flight; (3) to evaluate the Loran-C navigator performance in several offshore missions. The primary conclusions of this flight test evaluation were: the navigator was acceptable in the operational environment of the Northeast Corridor for both enroute and point-in-space approaches; the navigator satisfied AC 90-45A crosstrack accuracy requirements for enroute, terminal area and non-precision approaches; the production navigator satisfied alongtrack AC 90-45A accuracy requirements for enroute and terminal area, but not for non-precision approaches; the navigator performed acceptably during all phases of offshore testing. (Author)

AD-A075 486/1 PC **A04**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City Nj
Summary of Transponder Data June 1977 through August 1978.
Interim rept. Jun 77-Aug 78,
Max Greenberg. Aug 79, 53p FAA-NA-79-23, FAA-RD-79-56

The purpose of this effort was to determine the performance characteristics of transponders and digitized altimeters in an operational environment in general aviation aircraft. A transponder performance anlayzer (TPA) was developed at the National Aviation Facilities Experimental Center to measure performance parameters of transponders installed in aircraft. The TPA was installed in a bus for mobility and simulates an Air Traffic Control Beacon Interrogator (ATCBI) to facilitate measure-

ment of 15 transponder parameters in 30 seconds. A standard gain horn is utilized to couple the signals between the TPA bus and the aircraft. Transponder data were collected at four different geographic locations resulting in more than 950 samples of general aviation transponders. Results show that 36 percent of the transponders met all measured parameters. It is concluded that this sample has established a significant data base. It is recommended that a study be conducted to determine the effects on the ATCRBS by individually varying each of the 15 parameters outside of their specification limits. (Author)

AD-A075 521/5 PC **A03**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City Nj
Computer Study of Tulsa International Airport Runway 17R Glide Slope Sites.
Final rept. Feb-Nov 78,
Thomas J. Laginja. Sep 79, 46p FAA-NA-79-8, FAA-RD-79-27

The terrain at the approach end of Tulsa International Airport Runway 17R is of concern as to its effect on guidance signals radiated from an instrument landing system (ILS) glide slope antenna system. In order to select the antenna system that will result in the least perturbation of signal, the performances of Capture Effect, Sideband Reference, and Null Reference systems were compared using a mathematical simulation model on the National Aviation Facilities Experimental Center's (NAFEC) Honeywell computer. Since the mathematical model has not, as yet, been validated, the simulation results presented in this report are considered preliminary. Results show that performance, for both the Capture Effect and Sideband Reference systems were within Category I limits. Overall, a 2.8 deg capture effect system located outside the taxiway offers the best performance. (Author)

AD-A075 556/1 PC **A21**/MF **A01**
Ohio Univ Athens Dept of Electrical Engineering
In-Service Improvements to Reliability and Maintainability of the Instrument Landing System.
Final rept. Oct 77-May 79.
May 79, 487p EER-40-1, FAA-R-6750.2, FAA-AAF-420
Contract DOT-FA78WA-4062

This report documents results of task efforts undertaken by Ohio University between October 1977 and May 1979. Engineering data resulting from a study of the sideband reference, glide-slope system baseline operating parameters and the effects of specific faults are presented. A series of perturbational studies conducted at commissioned sideband reference facilities and numerous field experiments at Ohio University's Tamiami, Florida site facility are described. Suggested technical improvements and text changes for existing technical manuals have also resulted. The effects of a wide range of terrain profiles on the performance of sideband reference, null reference, and capture effect systems are compiled in album form. Sideband reference system setup procedures are reviewed, the electrical and physical requirements for the counterpoise are explored, and an introductory look at threshold-plane DDM profiles is presented. ILS anomaly investigations have resulted in the design, testing, and implementation of a modification to the Type FA-5723 clearance transmitter. Also, predictions of complete glide-slope performance for a proposed site on Runway 22L at Boston Logan are presented. The maximum allowable VSWR for the 15-element V-Ring and the O-Ring localizers are investigated based on theoretical and experimental work. The findings are that the maximum VSWR is not that of a simple specification but rather that of values that are within the bounds of worst and best-case conditions depending on the value of the complex reflection coefficient. (Author)

N79-32193/1 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
Navaid Calibration Evaluation with a Computer Controlled Avionics Data Acquisition System.
F. J. Abbink, and R. Krijn. 24 Aug 78, 41p NLR-MP-78030-U
Conf-Presented at 9th Aids Symp. Of the Deut. Studiengruppe fuer Flugdatensys. (DSF), Friedrichshafen, Germany, F.R., 26-27 Sep. 1978.

To evaluate the applicability and accuracy of multi-distance measuring equipment (DME) positioning, a computer-controlled avionics-data acquisition system (CADAS) was developed. CADAS adaptively tunes the DME interrogator and acquires selected, time tagged data for recording on magnetic tape. With CADAS several multi-DME evaluation flights were executed. The results on the position accuracy and coverage of the multi-DME system are presented. This system was also used as a reference for the calibration of an Inertial Sensor System (ISS). VHF omnidirectional radio range (VOR) navigation beacons, and an air traffic control (ATC) radar. The results of these ISS calibration flights are presented. The measured errors are compared with the computed error variance obtained by the application of a covariance model and ISS component error variances. Furthermore, the VOR calibration results for various orbital and radial flights on standard and Doppler VORs are presented. The influence of the position where the VOR is calibrated as well as the possibility of calibrating multiple VORs on the same flight are investigated. Results of ATC radar power density measurement flights at various altitudes and flight tracks are given.

N79-32194/9 PC **A05**/MF **A01**
Royal Aircraft Establishment, Farnborough (England).
Trials of the Doppler Microwave Landing System at London (Gatwick) Airport, August 1977.
P. L. Gibson. Aug 77, 83p RAE-TR-78124, BR66981
Subm-Sponsored by Min. Of Defence.

The trials of the Doppler microwave landing (DMLS) at Gatwick formed part of a series conducted at operational airports to collect data for the ICAO evaluation program. Typical data collected from the trials at Gatwick and analysis of the results show that DMLS met the performance requirements at this airport for line of sight propagation paths. No specific technique related effects were seen and the results are regarded as typical of C band MLS performance at this airport.

N79-32195/6 PC **A07**/MF **A01**
Royal Aircraft Establishment, Farnborough (England).
Trials of the Doppler Microwave Landing System at Manchester International Airport, October/November 1977.
D. Walker. 1977, 130p RAE-TR-78144, BR67351
Subm-Sponsored by Min. Of Defence.

Tests performed at Manchester to determine the multipath environment are described. High levels of azimuth system multipath were found close to the runway threshold but azimuth systems with as small an aperture as 20 wavelengths (1.2 m) gave the equivalent of ILS Category 3 accuracy. No isolated sources of elevation multipath were found and a 39 wavelength aperture system (2.3 m) gave the equivalent of ILS Category 3 accuracy for 3 deg approaches. The coverage requirement of 20 n mile range and + or - 40 deg azimuth was achieved at heights sufficient to give clear line of sight, but at elevation angles below about 1.5 deg shadowing caused signal loss and large errors. Autolands were demonstrated using the 54 wavelength aperture systems. No specifically technique related effects were seen and the results are regarded as representative of typical C-band MLS performance.

N79-32205/3 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
Low-Cost Inertial Navigation for Moderate-G Missions.
S. Merhav. Sep 79, 61p NASA-TM-78611, A-7920

A low cost inertial navigation system (INS) concept is described for flight missions characterized by moderate accelerations and limited attitude variations. These missions involve general aviation aircraft, helicopters, or remotely piloted vehicles. The significance of the moderate acceleration and limited attitude is reviewed with respect to platform mechanization and instrumentation. A hybrid mechanization, partially gimballed and partially strapdown, is presented. The INS is implemented by an unbalanced two axis gimbal system and controlled by a two degree of freedom gyro. The INS provides locally level two axis acceleration information along with pitch and roll measurements. Heading information is provided by a second gyro mounted in the inner gimbal. The system error model is equivalent to that of a conventional platform with a tilt error determined by the integral of the gyro drift rate and an equivalent accelerometer type errors are also cancelled. Rapid gyro-compassing, implemented with opened gimbal control loops, and a strapdown procedure provides calibration of gyro drift rate biases.

N79-33185/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Multiple Speed Expandable Bit Synchronizer.
J. M. Bundinger. Aug 79, 13p NASA-TM-79262, E-176

A multiple speed bit synchronizer was designed for installation in an inertial navigation system data decoder to extract non-return-to-zero level data and clock signal from biphase level data. The circuit automatically senses one of four pre-determined biphase data rates and synchronizes the proper clock rate to the data. Through a simple expansion of the basic design, synchronization of more than four binarily related data rates can be accomplished. The design provides an easily adaptable, low cost, low power alternative to external bit synchronizers with additional savings in size and weight.

PB80-105976 PC **A08**/MF **A01**
Pennsylvania Univ., Philadelphia. Dept. of Civil and Urban Engineering.
Optimal Flow Control of Air Traffic.
Final rept.,
William J. Dunlay, Jr., and W. Bruce Allen. Aug 79, 155p DOT/RSPA/DPB/50-79/15
Contract DOT-OS-70065

Flow control procedures for air traffic are initiated during periods of unusually high demand or low capacity. This report considers centralized flow conrol as now practiced. Aspects of flow control which are addressed include forecasting of demand and capacity, forecasting of congestion, and assignment of delays and landing and departure priorities. In particular, the demand-capacity-buffer relationship is explored, with emphasis on improvement of forecasts and evaluation of their accuracy. It is shown that buffer size, which represents the excess number of aircraft in the airspace due to delays, can be estimated recursively and then forecasted on the basis of arrival forecasts and the number of landings recorded. Regression analysis is used to describe and predict flow rates of arrivals and departures. Some preliminary studies using ADR and ARTS-III data are presented. A study of the equitability of the distribution of flow control delay treats delay and equity measures, and impact groups and impact variables are identified.

17H. Optical Detection

AD-A075 073/7 Not available NTIS
Colorado State Univ Fort Collins Dept of Earth Resources
A Portable Instrument for Simultaneous Recording of Scene Composition and Spectral Reflectance.
Joseph K. Berry , Frederick J. Heimes , and James A. Smith. 22 Mar 77, 4p ARO-13444.3-GS
Grant DAAG29-76-G-0105
Availability: Pub. in Optical engineering, v17 n2 p143-146 Mar-Apr 78 (No copies furnished by DTIC).

No abstract available.

AD-A075 373/1 PC **A06**/MF **A01**
Syracuse Univ Ny Dept of Electrical and Computer Engineering
DEFT: Advanced Structures and Applications.
Final rept. 10 Jun 77-Mar 79,

Stephen T. Kowel , Philipp G. Kornreich , Amaresh Mahapatra , Dennis Cleverly , and Thomas Szebenyi . 30 Jun 79, 102p Rept no. TR-79-12
Contract DAAG53-76-C-0162

During the period covered by this report, major progress was achieved in several areas, including the CdS sensor, light valve, and applications. The major impetus to this work is the desirability of a real-time, programmable sensor for use in image and signal processing. The basic result from any of these devices is a detected electronic signal current. The 30 MHz CdS/LiNbO3 sensor can now be routinely fabricated as a monolithic structure, using a metallized polymer pedestal for sampling. This permits the device to be incorporated in a camera-like box with a highly convergent commercial lens for use under typical incoherent illumination conditions. Extensive effort has led to the successful operation of both 35 MHz and 100 MHz devices based on our experience with the 30 MHz structure. Beyond the extra care required during the photolithography in order to obtain the three-fold increase in resolution, we had to overcome an excessively large acoustic loss encountered at the higher frequencies.

17I. Radar Detection

AD-A075 081/0 Not available NTIS
Alabama Univ University Dept of Electrical Engineering
On Increasing Usable MTI Filter Bandwidth by Removing Linear-Phase Constraint,
Ronald C. Houts , and H. Paul Hassell, III. 5 Dec 78, 4p ARO-13720.9-ELX
Grant DAAG29-76-G-0212
Availability: Pub. in IEEE Transactions on Aerospace and Electronic Systems, vAES-15 n4 p567-570 Jul 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 089/3 Not available NTIS
Alabama Univ University Dept of Electrical Engineering
The Effect of MTI Filter and Number of Unique Staggers on First-Null Depth and Clutter Attenuation,
Ronald C. Houts , and Stephen B. Crabtree. 15 Aug 77, 6p ARO-13720.5-ELX
Grant DAAG29-76-G-0212
Availability: Pub. in IEEE Transactions on Aerospace and Electronic Systems, vAES-15 n1 p163-168 Jan 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 368/1 PC **A03**/MF **A01**
Naval Research Lab Washington Dc
Angle-of-Arrival Estimation Error for Shipboard Monopulse Radars.
Interim rept.,
B. H. Cantrell. 12 Sep 79, 26p NRL-8333, AD-E000 327

Angle estimates by shipboard monopulse radars are corrupted by sea-reflected multipath. It is shown that even though the elevation and azimuth estimates in antenna coordinates are badly corrupted for conditions of crosslevel and sea-reflected multipath, the azimuth error in the plane of the sea may be tolerable. The azimuth errors in the plane of the sea are often less than 0.1 beamwidth. The errors were studied under a variety of conditions and the effect of scanning off axis as in a phased array was also included. (Author)

AD-A075 516/5 PC **A04**/MF **A01**
Georgia Inst of Tech Atlanta Engineering Experiment Station
Millimeter Radar Sea Return Study.
Final technical rept. Feb-Oct 78,
Robert N. Trebits. Apr 79, 62p Rept no. GIT/EES-A-2013-FTR
Contract N60921-77-C-A168

A site selection process was performed for a planned field exercise to measure radar sea clutter reflectivity at low grazing angles using several radar frequencies between 9.5 and 95 GHz. A detailed test plan was developed to collect calibrated radar cross section data over a variety of geometric and environmental conditions. The data collection and calibration processes have been described using radar systems and ancillary electronic equipment. (Author)

AD-A075 542/1 PC **A02**/MF **A01**
Autometric Inc Falls Church Va
Feasibility Study for Field Generation of Input for Radar Scene Generation from DLMS Terrain and Elevation Data.
Contract rept.
24 Nov 78, 25p FTR-900-0005, ETL-0203
Contract DAAK70-78-C-0208

This report describes the feasibility of performing the conversion of data from a field deployable data base to input for a radar scene generation algorithm in the field within a less than 10-minute period. Although the method described is not the only method, it is one which will work within the time allotted and fulfills other criteria, such as amount of disc storage required and computer power available. (Author)

18. NUCLEAR SCIENCES AND TECHNOLOGY

18A. Fusion Devices (Thermonuclear)

AD-A075 362/4 PC **A04**/MF **A01**
Naval Research Lab Washington Dc
Theory of Electron Cyclotron Resonance Heating of Tokamak Plasmas.
Interim rept.,
Edward Ott , Bertram Hui , and K. R. Chu. 19 Sep 79, 70p Rept no. NRL-MR-4028

A theoretical study of tokamak plasma heating by the electron cyclotron resonance is presented. The density limitations imposed by accessibility are first reviewed. Then the predictions of linear theory (including relativistic effects on the wave absorption) are examined via solution of the ray equations in a toroidal tokamak equilibrium. These solutions indicate quite favorable characteristics for large tokamaks. Finally, the possibilities of scattering of the incident heating wave by existing drift-wave-type fluctuations and of parametric instability are examined; it is tentatively concluded that parametric instabilities and wave scattering should not be important in typical situations of interest. (Author)

ANL/FPP-78-4 PC **A05**/MF **A01**
Argonne National Lab., IL.
Fusion Power Program. Quarterly Progress Report, October--December 1978.
Apr 79, 94p
Contract W-31-109-ENG-38

This quarterly report summarizes the Argonne National Laboratory work performed for the Office of Fusion Energy during the October--December 1978 quarter in the following research and development areas: materials; energy storage and transfer; tritium containment, recovery and control; advanced reactor design; atomic data; reactor safety; fusion-fission hybrid systems; alternate applications of fusion energy; and other work related to fusion power. Three separate abstracts were prepared for the included sections. (ERA citation 04:052360)

DOE/ET-0103 PC **A05**/MF **A01**
Department of Energy, Washington, DC.
Electrical Problems Committee Report.
Jun 79, 78p

This document is the report of the committee appointed to review the experience of the MFE Program with electrical equipment and to suggest actions to minimize future problems. The committee observed that the electrical problems that have occurred could be traced not to misapplication of project and engineering technical principles, but to lack of application of project and engineering management principles. The report is structured so that the first four sections: Introduction, Findings, Recommendations, and Immediate Recommended Actions, can be used as an executive summary. The discussion section and attachments contain further detail. (ERA citation 04:052368)

IAE-2979 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Dynamics of the Breakaway Instability Development in a Tokamak.
N. V. Ivanov. 1978, 8p
In Russian.
U.S. Sales Only.

Presented are some considerations on possible dynamics of discharge voltage pulses appearing at breakaway instability in a tokamak. Considerations based on the profile relaxation oscillation model of radial distribution of discharge current. The estimation of increments of instability development, necessary for explanation of experimentally observed pre-breakaways and breakaways is given. The obtained values of maximum increments (gamma sub(max) approximately 1.5x10 exp 4 c exp -1 for small breakaways, and gamma sub(max) approximately 3x10 exp 6 c exp -1 for breakaways) are in agreement by the order of magnitude with theoretically predicted values of increments of dissipative tiring-instability. (Atomindex citation 10:450652)

LBL-9332 PC **A06**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Development of Heavy-Ion Accelerators as Drivers for Inertially Confined Fusion.
W. B. Herrmannsfeldt. Jun 79, 116p SLAC-221
Contract W-7405-ENG-48

The commercialization of inertial confinement fusion is discussed in terms of power costs. A chapter on heavy ion accelerators covers the principal components, beam loss mechanisms, and theoretical considerations. Other tyopics discussed include the following: (1) heavy ion fusion implementation plan, (2) driver with accumulator rings fed by an rf LINAC, (3) single pass driver with an induction LINAC, and (4) implementation scenarios. (ERA citation 04:052376)

N79-33027/0 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Preliminary Experiment of Neutral Beam Injection Heating in JIPP T-2 Device.
T. Kuroda, Y. Oka, H. Okamura, H. Aoki, and T. Kunibe. Jul 79, 23p IPPJ-392

Neutral beam injection heating was applied in JIPP T-2 Tokamak plasma. Time evolution of the ion temperature and the high energy component of ions were investigated. The ion temperature rise is scale as about 1.5 eV per kilowatt of injected beam power in average. Net electron heating is observed in the case of high power injection. The change in n sub e (t) and impurities associated with injection is described. Simultaneous application of heating of neutral beam injection and lower hybrid heating was carried out.

N79-33062/7 PC **A02**/MF **A01**
National Physical Lab., Teddington (England). Div. of Electrical Science.
Diagnosis of the Jet Plasma Using Electron Cyclotron Emission.
D. V. Bartlett, and A. E. Costley. Mar 79, 24p NPL-DES-53
Subm-Submitted for Publication.

Recent developments in Tokamak electron cyclotron emission are reviewed with particular attention being paid to diagnostics for the jet plasma. An improved calculation of the likely emission from this plasma is made and the diagnostic potential is re-evaluated. It is shown that in addition to the earlier predicted possibilities it ought to be possible to obtain the electron temperature with space and time resolution from data obtained on a single plasma pulse. In addition, by measuring the emission at particular frequencies it ought to be possible to investigate any very fast fluctuations in the temperature (nearly greater than 1 microsectime scale) that might occur at specific positions in the plasma. Some techniques for carrying out be necessary measurements are recommended and areas where futher work is required are identified. Finally, a diagnostic possibility is suggested.

N79-33064/3 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.
On the Scaling of Magnetic Plasma Confinement under Classical Conditions.
B. Lehnert. Apr 79, 15p TRITA-PFU-79-05

The idealized case of classical plasma confinement in a closed magnetic bottle is theoretically discussed. The scaling laws obtained for Tokamaks and similar devices indicate that large linear dimensions and considerable heating powers are required to reach the parameter regime of thermonuclear conditions. In light of the great potentialities of fusion energy, the need for more powerful confinement schemes is shown. An alternative scheme is sought which provides stable confinement of a pure plasma while minimizing plasma losses and increasing beta values. No suggestion is made for specific field geometries which could meet these requirements. Reactor technological aspects are also excluded from the discussion.

ORNL/TM-6845 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
NFREYA: A Monte Carlo Beam Deposition Code for Noncircular Tokamak Plasmas.
R. H. Fowler, J. A. Holmes, and J. A. Rome. Jul 79, 31p
Contract W-7405-ENG-26

A computer code is described which calculates the initial fast ion deposition for neutral beam injection into noncircular tokamak plasmas. The beam deposition is calculated by Monte Carlo techniques as a function of the poloidal flux function psi. The flux function and plasma parameters are obtained from the numerical solution of the axisymmetric MHD equilibrium equation. Bounce averages are performed over the initial ion orbits, and the deposition is weighted by the fraction of time the ion spends in each interval of the psi grid. The divergence, focusing, and shape of the neutral beam are modeled. The beam geometry part of this problem was solved by G. G. Lister, D. E. Post, and R. Goldston of the Princeton Plasma Physics Laboratory in a code called FREYA. The code described here is a modification of FREYA. Comparisons of the beam depositions calculated with bounce averaging are made with the ion birth depositions for the PDX and ISX-B tokamaks. (ERA citation 04:052337)

SAND-79-1129 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Computations of the Spherical E Implies I Convertor.
J. W. Poukey. May 79, 24p
Contract EY-76-C-04-0789

One proposed approach to the overlap/deposition problem for multi-channel electron beams is to place a thin hollow sphere in the overlap region and allow the incoming electrons to form a virtual cathode inside this sphere. The resulting electric field causes ions from the inner surface of the sphere to flow inward radially towards a target. The efficiency of this process is studied analytically and with a 1-D spherical, two-species electrostatic particle code. The maximum possible (power conversion) efficiency is concluded to be about 10 percent. Two-dimensional effects are briefly considered, and angular momentum in particular is found to be a possibly serious limitation. (ERA citation 04:052378)

18B. Isotopes

N79-33007/2 PC **A03**/MF **A01**
Instituut voor Kernphysisch Onderzoek, Amsterdam (Netherlands). Dept. of Chemistry.
Radioisotope Production with Electron Accelerators.
G. A. Brinkman. 1978, 43p REPT-78/5

The production of radioisotopes with electron accelerators is considered for thin secondary proton converters in combination with an electron sweep magnet. The production yields depend on the initial electron energy, the Z and thickness of the converter, the Z, A, and the thickness of the target, the geometric set up, and the cross section for a particular reaction. Simple formulas are given for the calculation of production yields under standard conditions with only the cross section per equivalent quantum and the fraction of the photons that hit the target as variables, and for the calculation of the dose rate at the production point. The units in which the yields are expressed in the literature (units of cross section, dose, electron beam intensity, monitor response) are discussed.

18C. Nuclear Explosions

AD-A075 357/4 PC **A10**/MF **A01**
Nevada Test Organization (Aec) Mercury Off-Site Radiological Safety Activities
Operation PLUMBBOB Off-Site Radiological Safety Report. Nevada Test Site,
O. R. Placak , M. W. Carter , R. A. Gilmore , Roscoe H. Goeke , and Charles L. Weaver. 1957, 219p Rept no. OTO-57-3

The purpose of this report is to present a concise summary of off-site rad-safe activities during Operation PLUMBBOB and to serve as a source of information to interested AEC and health agency personnel. All pertinent data necessary to evaluate the off-site exposure effects of the operation in populated areas are included. In the interests of brevity, selected data only are given for non-populated areas and for certain other items, such as shielding and weathering. Complete monitoring logs and detailed film badge results covering these areas are, however, available from the files of the Las Vegas Branch, AEC. Also available from this office are the detailed data from which certain of the summaries were compiled. Throughout the entire report, maps, tables, graphs, and diagrams have been used extensively for brevity and for clarity. Except in the chapter on individual shot summaries, tables, graphs, etc., are placed at the end of the chapter to which they refer and in the sequence of referral in the chapter.

18D. Nuclear Instrumentation

LA-7882-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Experimental Comparison of the Active Well Coincidence Counter with the Random Driver.
H. O. Menlove, N. Ensslin, and T. E. Sampson. Jun 79, 28p
Contract W-7405-ENG-36

A direct comparison has been made between the IAEA Active Well Coincidence Counter (AWCC) and the CMB-8 Random Driver. The comparison included an experimental evaluation of precision, counting rate, accuracy, penetrability, stability, and the effect of sample inhomogeneity. Samples used in the evaluation included highly enriched U sub 3 O sub 8 , U sub 3 O sub 8 mixed with graphite, highly enriched uranium metal discs, and depleted uranium metal. These materials are typical of the samples of interest to the IAEA inspectors. It was concluded that the two instruments had very similar performance characteristics with the Random Driver giving better penetrability and the AWCC giving better stability. (ERA citation 04:051185)

18E. Nuclear Power Plants

GA-A-15002 PC **A05**/MF **A01**
General Atomic Co., San Diego, CA.
Gas Turbine HTGR Program. Quarterly Progress Report for Period Ending March 31, 1978.
Jun 79, 100p
Contract EY-76-C-03-0167-046

This report describes work performed on the direct cycle high-temperature gas-cooled reactor (DC-HTGR) program, Department of Energy Contract EY-76-C-03-0167, Project Agreement No. 46, during the period January 1, 1978, through March 31, 1978. The report covers the demonstration plant design studies, heat exchanger design studies, structural engineering studies, auxiliary system design, system engineering analysis, and reactor core engineering. (ERA citation 04:051475)

GA-A-15400 PC **A05**/MF **A01**
General Atomic Co., San Diego, CA.
Anchor Stud Monotonic and Cyclic Shear Tests. Final Report.
J. L. Pickering. Jul 79, 94p
Contract EY-76-C-03-0167-061

In a prestressed concrete reactor vessel (PCRV), the main cavity liner and other cavity liners with large diameter/thickness (D/t) ratios are anchored to the concrete by anchor studs. These anchor studs are subject to shear loading resulting from prestressing, pressurization, temperature, and creep of the PCRV. The test program discussed in this report consists of both monotonic and cyclic testing of models simulating the prototype anchor stud/concrete assembly. The tests determined the shear stiffness characteristics of the 3/4-in.-diameter, one-piece Nelson anchor stud embedded in concrete and established its low-cycle fatigue life under displacement-controlled loading. The previously obtained results of Phase I and Phase II tests on two-piece anchor studs, along with high-cyclic fatigue data taken from the literature, are discussed and are plotted with the current, Phase III, results to form a displacement versus cycles to failure curve covering a useful range of design applications. (ERA citation 04:051555)

NUREG/CR-1067 PC **A08**/MF **A01**
University of Southern California, Los Angeles. Dept. of Civil Engineering.
Design Charts for a Class of Nonlinear Systems with Gaps Under a Variety of Dynamic Loads.
Topical rept. 1 Oct 78-30 Sep 79,
J. C. Anderson. Nov 79, 175p
Contract NRC-04-76-262

An analytical investigation is made of the dynamic response of a multi-degree-of-freedom system with a displacement nonlinearity caused by a dead space gap. This class of problem can be used to model some of the mechanical equipment, piping, and components found in nuclear reactor facilities. The problem is discretized mathematically and numerical techniques are used to solve the resulting equations of motion. Displacement response spectra are developed for a variety of system parameters and dynamic loadings that include sinusoidal, random, and halfsine pulse. These response spectra form a library of design charts that provide useful information for designers and engineers.

NUREG-0348 PC **A19**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Div. of Site Safety and Environmental Analysis.
Demographic Statistics Pertaining to Nuclear Power Reactor Sites.
Technical rept.,
D. F. Bunch, L. W. Bell, C. M. Farrell, L. C. Gibson, and K. G. Murphy. Nov 79, 429p

This report provides a consolidation of data which deals with the populations in areas surrounding nuclear power reactors, so as to permit evaluations of the aggregate results, including trends of siting practices. The report attempts to summarize the overall results of many case-by-case decisions on individual license applications from the standpoint of various demographic statistics. The report provides, in one source, population statistics for 145 power plant sites, including summary tables and figures developed to aid in the evaluation of trends and general patterns associated with the various parameters of interest, such as the proximity of nuclear plant sites to centers of population. One of the reasons for publishing this information at this time is to provide a factual basis for use in discussions on the subject of reactor siting policy.

ORNL/TM-6804 PC **A09**/MF **A01**
Oak Ridge National Lab., TN.
Study of the Cherokee Nuclear Station: Projected Impacts, Monitoring Plan, and Mitigation Options for Cherokee County, South Carolina.
E. Peelle, M. Schweitzer, P. Scharre, and B. Pressman. Jul 79, 187p
Contract W-7405-ENG-26

This report inventories Cherokee County's capabilities and CNS project characteristics, projects expected impacts from the interaction of the two defines four options for Cherokee County decision makers, and presents a range of possible mitigation and monitoring plans for dealing with the problems identified. The four options and general implementation guidelines for each are presented after reviewing pertinent features of other mitigation and monitoring plans. The four options include (1) no action, (2) preventing impacts by preventing growth, (3) selective growth in designated areas as services can be supplied, and (4) maximum growth designed to attract as many in-movers as possible through a major program of capital investments in public and private services. With the exception of the no action option, all plans deal with impacts according to some strategy determined by how the

County wishes to manage growth. Solutions for impact problems depend on which growth strategy is selected and what additional resources are secured during the impact period. A monitoring program deals with the problems of data and projections uncertainty, while direct action is proposed to deal with the institutional problems of delay of the needed access road, timeing and location problems from the tax base mismatch, and lack of local planning capability. (ERA citation 04:051456)

PB80-105968 PC **A17**/MF **A01**
Johns Hopkins Univ., Baltimore, MD. Chesapeake Bay Inst.
Physical Hydrography and Dispersion in a Segment of the Chesapeake Bay Adjacent to the Calvert Cliffs Nuclear Power Plant.
Special rept. (Final),
Donald W. Pritchard, and Stephen R. Rives. Aug 79, 382p CBI/SR-74, PPSP-MP-26

This report gives the results of an analysis of data collected during a field study conducted in a segment of the Chesapeake Bay adjacent to the Calvert Cliffs Nuclear Power Plant during October 1977. The field study was first conceived with the primary intent of obtaining data to be used for boundary values and for verification of a three-dimensional numerical model now under development for application to the study area. A second major purpose was then added, that of describing the horizontal and vertical distribution of dilution and of excess temperature in the near and intermediate field of the thermal plume that results from the discharge of heated effluent from the power plant. The final purpose of the study was to obtain data adequate for evaluation of the far field of dilution of the effluent plume.

PNL-2988 PC **A05**/MF **A01**
Battelle Human Affairs Research Centers, Seattle, WA.
Relationship of Human Values and Energy Beliefs to Nuclear Power Attitude.
W. L. Rankin, and S. M. Nealey. Nov 78, 96p
Contract EW-78-C-06-1076

This executive summary highlights the major findings of a nuclear power mail-out survey administered to a random sample of Washington residents, a random sample of nuclear neighbors from the region around the Hanford Reservation, and a random sample of Washington environmentalists. The purpose of the research was twofold. First, it investigated the relationship of human values to one's attitude about the continued development of nuclear power. Second, it investigated the relationship of general energy beliefs and beliefs about specific nuclear power issues to one's attitude about the continued development of nuclear power. The findings are presented in summary form by posing and answering questions of policy relevance to the Department of Energy. (ERA citation 04:051636)

18F. Radiation Shielding and Protection

ORNL-5551 PC **A08**/MF **A01**
Oak Ridge National Lab., TN.
Analysis of the ORNL/TSF GCFR Grid-Plate Shield Design Confirmation Experiment.
C. O. Slater, S. N. Cramer, and D. T. Ingersoll. Aug 79, 172p
Contract W-7405-ENG-26

The results of the analysis of the GCFR Grid-Plate Shield Design Confirmation Experiment are presented. The experiment, performed at the ORNL Tower Shielding Facility, was designed to test the adequacy of methods and data used in the analysis of the GCFR design. In particular, the experiment tested the adequacy of methods to calculate: (1) axial neutron streaming in the GCFR core and axial blanket, (2) the amount and location of the maximum fast-neutron exposure to the grid plate, and (3) the neutron source leaving the top of the grid plate and entering the upper plenum. Other objectives of the experiment were to verify the grid-plate shielding effectiveness and to assess the effects of fuel-pin and subassembly spacing on radiation levels in the GCFR. The experimental mockups contained regions representing the GCFR core/blanket region, the grid-plate shield section, and the grid plate. Most core design options were covered by allowing: (1) three different spacings between fuel subassemblies, (2) two different void fractions within a subassembly by variation of the number of fuel pins, and (3) a mockup of a control-rod channel. (ERA citation 04:051516)

18G. Radioactive Wastes and Fission Products

DP-MS-79-13 PC **A02**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Geohydrologic Investigations of Buried Metamorphic Rock and Mudstone for the Storage of Radioactive Waste.
I. W. Marine. 1979, 12p CONF-790320-1
Contract EY-76-C-09-0001
Workshop on Low-Flow Low permeability measurements in Langley Impermeable rocks, Paris, France, 19 Mar 1979.

From 1961 to 1972, a geohydrologic investigation of crystalline metamorphic rock and Triassic mudstone was carried on at the Savannah River Plant in order to evaluate the feasibility of storing radioactive waste in these host rocks. Although this investigation is no longer active, many of the concepts, testing methods, and results developed in this investigation are applicable to investigations currently being conducted at other locations for geologic storage of radioactive waste. (ERA citation 04:035906)

HEDL-TME-78-89 PC **A03**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Spent Thermal Reactor Fuel Assembly Characterization with Solid State Tract Recorders.
R. Gold, F. H. Ruddy, E. P. Lippincott, W. N. McElroy, and J. H. Roberts. Jun 79, 35p
Contract EY-76-C-14-2170

A scoping experiment to characterize the neutron field generated from a Light Water Reactor spent fuel assembly has been successfully completed. Solid State Track Recorder (SSTR) neutron dosimeters were exposed at the surface of a spent fuel assembly from a Pressurized Water Reactor. Acceptable track densities were obtained. From these SSTR neutron dosimetry measurements, an absolute neutron flux of about 8 x 10 exp 3 n/cm exp 2 sec was determined at the surface of the spent fuel assembly deduced neutron energy flux, with a mean neutron energy of about 1.3 MeV, is intimately dependent upon the actinide content of the spent fuel. (ERA citation 04:051646)

HEDL-TME-79-11 PC **A03**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Waste Management of Mercuric Nitrate off-Gas Scrubber Solution: A Laboratory Study.
J. A. Partridge, and G. P. Bosuego. Jul 79, 38p
Contract EY-76-C-14-2170

Laboratory studies of a process for volume reduction treatment of a waste mercuric nitrate--nitric acid off-gas scrubber solution containing iodine are reported. Volume reduction is accomplished by evaporation at the boiling point. In order to prevent volatilization of iodine, the process involves feeding the iodine-containing scrubber solution, typically 8 to 10 M in nitric acid, into an evaporator initially charged with concentrated (approx. 15.8 M) nitric acid. The iodine is oxidized to nonvolatile iodate under these conditions and precipitates as mercuric iodate. 5 figures, 10 tables. (ERA citation 04:051164)

NUREG/CR-0956 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Commentary on Spent Fuel Storage at Morris Operation.
Technical rept. 1972-78,
K. J. Eger, and G. E. Zima. Oct 79, 118p PNL-3065
Contract DOE-EY-76-C-1830

The purpose of this report is to provide a description of spent fuel handling activities and systems, and an analysis of the storage performance as developed over the seven year operational history of the Morris Operation. Design considerations and performance are analyzed for both the basin and key supporting systems. The bases for this analysis are the provisions for containing radioactive by-product materials, for shielding from the radiation they emit, and for preventing the formation of a critical array.

N79-32999/1 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
Long-Term Storage of Irradiated Candu Fuel under Water.
J. F. Walker. Jan 79, 24p AECL-6313

The various factors influencing the long-term integrity of stored fuel are considered. Zirconium-alloy-clad uranium dioxide fuel and evidence from Canada and elsewhere is considered. Under storage conditions, changes take place so slowly, if at all, that no evidence has been obtained that indicates any deterioration of stored fuel after 10 to 15 years under water. All the information now available indicates that irradiated CANDU fuel may be safely stored by the present methods as long as it is technically and economically desirable to do so. Stored fuel should continue to be examined after increasingly long storage times under water to confirm the stability of the Zircaloy cladding containing the fuel pellets.

N79-33000/7 PC **A01**/MF **A01**
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
Management of Radioactive Fuel Wastes: The Canadian Disposal Program.
J. Boulton. Oct 78, 143p AECL-6314

The research and development program to verify and demonstrate the concepts for the safe, permanent disposal of radioactive fuel wastes from Canadian nuclear reactors is presented. The program is concentrating on deep underground disposal in hardrock formations. The nature of the radioactive wastes is described, and the options for storing, processing, packaging and disposing of them are outlined. The program to verify the proposed concept, select a suitable site and to build and operate a demonstration facility is described.

N79-33001/5 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
Risk Assessment for Radioactive Waste Disposal.
R. B. Lyon. Jan 79, 21p AECL-6322

The objectives of risk assessment studies for radioactive waste disposal are: to specify the features that prevent the escape of radionuclides from a deep disposal vault, to estimate how effective these features are likely to be, and to determine the potential consequences of the expected situation and conceivable but unlikely situations. The major features to be analyzed include the insoluble nature of the waste form itself, the resistance of its container to corrosion or mechanical damage, the effectiveness of the massive rock barrier and the hold-up and dilution of radionuclides in the surface environment. Computer modelling is used in a technique called pathway analysis to bring together the experimental data, field data and understanding of the relevant phenomena into an assessment of the resultant effect on man and the environment.

ONWI-41 PC **A06**/MF **A01**
Battelle Project Management Div., Columbus, OH. Office of Nuclear Waste Isolation.
Storage Room Design Parameters for the ONWI Spent Fuel Disposal Study; Nine Case Studies in Salt.
May 79, 102p
Contract EY-76-C-06-1830

Each spent fuel processing option, defined by Bechtel, Inc., is compared with a reference case which considered High-Level Waste from reprocessing with U/Pu recycle and a base case which considered the simple encapsulation of spent fuel assemblies. For each case, a minimum extraction ratio was defined consistent with defined thermal limits, where the extraction ratio is defined as the fraction of excavated area per unit of repository

area (area of room/area of room + area of pillar). By minimizing the extraction ratio for a given repository capacity, the excavation costs are reduced, resulting in a significant reduction in overall repository cost. Another benefit is increased repository stability since the supporting pillars now encompass a larger percentage of the total repository area. To determine minimum extraction ratios, thermal analyses were conducted for a repository that would store the waste from the Reference Case, the Base Case, and the other options for spent fuel processing. These analyses determined maximum waste and salt temperatures that would occur in the repository regions in which heat-generating waste was buried for a variety of emplacement configurations. The maximum number of canisters of heat-producing waste stored in each room which does not exceed temperature limitations imposed on the waste and the salt is then determined. Therefore, by maximizing the effective use of the canistered-waste rooms, the number of rooms required for a given waste receipt rate is minimized, and thus the extraction ratio is minimized. (ERA citation 04:051160)

ORNL-5524 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Cement Technology for Plugging Boreholes in Radioactive Waste Repository Sites. Progress Report, October 1, 1977--September 30, 1978.
J. G. Moore, M. T. Morgan, E. W. McDaniel, H. B. Greene, and G. A. West. Aug 79, 80p
Contract W-7405-ENG-26

Experiments are in progress using 34 batches of cements from 13 different locales, representing 11 types of cement, and 17 batches of fly ash from 14 suppliers. Data are being obtained from physical and chemical test methods and from measurements made in parametric studies involving cement--fly-ash concretes and saltcretes. Addition of 10 wt % salt to a standard mortar will double the initial and final set times. The set time of the saltcrete can be increased or decreased by a lignite fly ash or bituminous fly ash respectively. The compressive strengths of mortars were measured at 7, 28, and 91 days. The compressive strengths of cement--fly-ash concretes were found to vary with curing time and the fly ash composition. The strengths of saltcretes decreased with increasing salt concentration but increased with the addition of fly ash; the effect of the fly ash composition was apparently negligible. The thermal conductivities of cementitious solids, were found to increase with density and with sand and/or salt concentration. Thermal conductivities of saltcretes decreased with increasing temperature but remained almost constant in neat cement pastes. The conductivity values ranged from 0.4 W/m.K for a neat cement paste to 1.8 W/m.K for a salcrete. Results for a number of saltcretes under the same drying conditions showed that the apparent liquid permeability decreased with increasing salt content. Shrinkage of neat pastes and saltcretes varied approximately linearly with time, while cement--fly-ash solids showed a high rate in the first few weeks followed by a lower rate for a longer time period. (ERA citation 04:051167)

PB80-105042 PC **A12**/MF **A01**
NUS Corp., Palo Alto, CA.
Low-Level Radioactive Waste Management. Volume I: Current Power Reactor Low-Level Radwaste.
Final rept.,
Fred Frizoliahi, John M. Connelly, Thomas L. Jentz, Les White, and Darrel Woo. Mar 78, 269p
CAEC-007
See also Volume 2, PB80-105059.
Also available in set of 5 reports PC E13, PB80-105034.

This study evaluates low-level waste management technology for light water reactors and identifies the problems that must be solved within the next few years to allow for the orderly development of large-scale management of low-level radioactive wastes generated at nuclear power facilities and by the nuclear power industry in California. This report is the first volume of a series and contains basic information and background data relative to the current industry practice in the area of power reactor low-level-waste management.

PB80-801772 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Radioactive Waste Disposal in Salt Deposits (A Bibliography with Abstracts).
Rept. for 1964-Nov 79,
Diane M. Cavagnaro. Dec 79, 257p
Supersedes NTIS/PS-78/1234 and NTIS/PS-77/1085.

This bibliography contains reports on underground disposal of radioactive wastes in salt deposits. The citations cover radiation protection, efficiency of the disposal method, sites that are selected, stability of the sites, mathematical models of the disposal method, hydrology, and design. (This updated bibliography contains 248 abstracts, 80 of which are new entries to the previous edition.)

PNL-2903 PC **A05**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Evaluation of Kriging Techniques for High Level Radioactive Waste Repository Site Characterization.
P. G. Doctor. Jan 79, 87p
Contract EY-76-C-06-1830

Kriging is a statistical method for estimating functions that describe spatially distributed phenomena such as groundwater elevation and depth to basalt. It produces a contour model of the geologic formation of a potential site with an associated measure of uncertainty, and it can be used to optimize the selection of additional sampling locations. Kriging was applied to water potential data and top-of-basalt elevations from the Hanford site; the computer code BLUEPACK was used to perform the computations. The water potential contours were in close agreement with a hand-drawn contour map which is used as a standard. It is concluded that kriging can be a useful tool for geologic waste repository site characterization. (ERA citation 04:051168)

STUDSVIK-RF-77-2268 PC **A03**/MF **A01**
Aktiebolaget Atomenergi, Studsvik (Sweden).
Updating the BEGAFIP Code.
K. Ekberg, and Goeran Olsson. Mar 78, 31p
In Swedish.
U.S. Sales Only.

The computer program BEGAFIP, for calculation of radiation source strengths and heat generation in spent reactor fuel, has been updated. A number of transuranium isotopes not previously considered and their decay chains are now included. A comparison is made to the CASMO program on the production of heavy elements. (Atomindex citation 10:430267)

TID-29018(DRAFT) PC **A08**/MF **A01**
Department of Energy, Washington, DC. Office of Nuclear Waste Management.
Earth Science Technical Plan for Mined Geologic Disposal of Radioactive Waste.
Jan 79, 160p

The major purposes of this report are to formally organize the individual earth-science research tasks directed toward a geologic repository for radioactive waste performed directly or by contract by the US Department of Energy (DOE) and the US Geological Survey (USGS), to show how these tasks address the principal remaining technical questions related to geologic disposal of nuclear waste, to identify technical questions that require additional attention, and to identify priorities for future work. In support of these purposes this report: presents a systematic review and identification of earth-science issues and recommends work that will support site characterization, evaluation, and selection; repository design and operation; and short- and long-term risk assessment. Inventories and classifies current technical R and D to facilitate integration and coordination of DOE and USGS sponsored work. Identifies R and D activities which should be more closely coordinated for timely resolution of technical questions. Specifies technical plans to resolve significant uncertainties regarding mined repositories, as discussed in the Interagency Review Group (IRG) Report to the President and Alternative Technology Strategies for the isolation of Nuclear-Waste, and other earth science reports. (ERA citation 04:051170)

UCRL-50027-78 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Environmental Monitoring at the Lawrence Livermore Laboratory. 1979 Annual Report.
W. J. Silver, C. L. Lindeken, K. M. Wong, A. Conover, and J. H. White. 11 Mar 78, 51p
Contract W-7405-ENG-48

In 1978, the annual average airborne gross beta activity in Livermore Valley air samples was 6.0 x 10 exp -14 mu Ci/ml, or half the average observed in 1977. Airborne exp 238 U concentrations at Site 300 were higher than those at Livermore because of the use of depleted uranium (a byproduct of exp 235 U enrichment) in high-explosive tests at the Site. Soil samples collected in the off-site vicinity of the Laboratory and at Site 300 were analyzed for plutonium. Water samples collected within the Livermore Valley and at Site 300 exhibit gross beta and tritium activities within the ranges previously observed in these areas. One well-water sample from Site 3900 shows an above-average level of gross alpha activity because of naturally occurring exp 226 Ra. Tritium analyses were made on well-water samples collected near the Livermore Water Reclamation Plant (LWRP). All are well below the standards set by DOE. Tritium levels in Livermore Valley and Site 300 vegetation were also comparable to those observed in 1977. For 1978, the median annual gamma-radiation dose rate at the Laboraotry perimeter was 64 mrem, which was essentially the same as the median off-site background of 59 mrem. Operation of a 14-MeV neutron generator near the south perimeter continued to be a source of elevated radiation. However, dose rates have been reduced to about one-third of those recorded in 1977 by scheduling many high-flux experiments at a new facility (Bldg. 292). Assessment of the calculated rdiation dose to an individual from the environmental concentrations listed in this report demonstrates that the dose contribution from Laboratory operations in 1978 was small compared to the dose received locally from natural sources. (ERA citation 04:052144)

18H. Radioactivity

AD-A075 033/1 PC **A02**/MF **A01**
Rome Air Development Center Hanscom AFB Ma Deputy for Electronic Technology
A Distribution Function for Ion Track Lengths in Rectangular Volumes,
John N. Bradford. 23 Aug 79, 4p Rept no. RADC/ETR-79-0014
Pub. in Jnl. of Applied Physics, v50 n6 p3799-3801 Jun 79.

No abstract available.

AD-A075 608/0 PC **A04**/MF **A01**
Naval Research Lab Washington Dc
Cooperative Radiation Effects Simulation Program.
Annual progress rept. 1 Sep 77-31 Aug 78,
F. A. Smidt, Jr. , and L. A. Beach. 4 Oct 79, 72p
Rept no. NRL-MR-4080

The Cooperative Radiation Effects Simulation Program (CORES) is a collaborative effort of the Material Science and Technology and Radiation Technology Divisions of NRL Material and Radiation Science and Technology Area. The goal of the research is to provide the theoretical and experimental bases for understanding the mechanisms of nuclear radiation damage of metals, as well as a theoretical insight into energy deposition processes. In this the Van de Graaff and Cyclotron are used to simulate rapidly the radiation damage produced over long periods in reactor neutron environments.

EGG-1183-1716 PC **A03**/MF **A01**
EG and G, Inc., Las Vegas, NV.
Limiting Values for Radionuclide Concentration in the Soil from Remote Spectrometer Measurements.
T. P. Stuart. Aug 77, 38p

Spectrometers that remotely sense gamma -rays in the soil are usually oriented with the normal to a planar surface perpendicular to the air-soil interface. When this is the case, and when the thickness of the detector is not greater than the linear dimensions that determine the aforementioned surface area, simple assumptions can be made to calculate high and low limits for factors that con-

vert from photopeak count rates in the spectrometer to soil concentrations. An H.P. 65 calculator program is developed to calculate these two conversion factors as a function of detector altitude, counting rates from a single measurement with a point calibration source, shielding on the surface of the detector, and depth of activity in the soil. The assumption of an exponential decrease with depth allows the previously reported results of Beck et al to be applied to convert from soil concentration to dose rate at 1 m above the ground. (ERA citation 04:052151)

NUREG/CR-0628 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Prediction of the Net Radon Emission from a Model Open Pit Uranium Mine,
K. K. Nielson, R. W. Perkins, L. C. Schwendiman, and W. I. Enderlin. Sep 79, 30p PNL-2889-REV
Contract DOE-EY-76-C-06-1830

Radon emission from a model open pit uranium mining operation has been estimated by applying radon exhalation fluxes measured in an open pit uranium mine to the various areas of the model mine. The model mine was defined by averaging uranium concentrations, mine dimensions, production and procedural statistics for eight major open pit uranium mines in the Casper, Wyoming area. The resulting emission rates were 630 Ci/Reference Reactor Year(RRY) during mining operations and 26 Ci/RRY/yr after abandonment of the mine assuming 100 percent recovery of U3O8 from the ore, or 700 Ci/RRY and 29 Ci/RRY/yr assuming 90.5 percent recovery.

NUREG/CR-0717 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
A Dynamic Model of the Global Iodine Cycle for the Estimation of Dose to the World Population from Releases of Iodine-129 to the Environment,
D. C. Kocher. Nov 79, 108p ORNL/NUREG/TM-59
Contract W-7405-eng-26

A dynamic linear compartment model of the global iodine cycle has been developed for the purpose of estimating long-term doses and dose commitments to the world population from releases of 129I to the environment. The environmental compartments assumed in the model comprise the atmosphere, hydrosphere, lithosphere, and terrestrial biosphere. The global transport of iodine is described by means of time-invariant fractional transfer rates between the environmental compartments. The tractional transfer rates for 129I are determined primarily from available data on compartment inventories and fluxes for naturally occurring stable iodine and from data on the global hydrologic cycle. The sensitivity of the calculated doses to variations in some of the paramters in the model from the global iodine cycle is investigated. A computer code written to calculate global compartments inventories and dose rates and population doses is described and,documented.

NUREG/CR-1030 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Sediment and Radionuclide Transport in Rivers. Phase I. Field Sampling Program during Mean Flow Cattaraugus and Buttermilk Creeks, New York,
R. M. Ecker, and Y. Onishi. Nov 79, 109p PNL-3117
Contract DOE-EY-76-C-06-1830
See also PB-293 417.

A field sampling program was conducted on Cattaraugus and Buttermilk Creeks, New York during November and December 1977 to investigate the transport of radionuclides in surface waters as part of a continuing program to provide data for application and verification of Pacific Northwest Laboratory's sediment and radionuclide transport mode, SERATRA. Suspended sediment, bed sediment and water samples were collected during mean flow conditions over a 45 mile reach of stream channel. Radiological analysis of these samples was conducted. Elevated levels of 137Cs and 90Sr were found down stream of the Nuclear Fuel Services Center, an inactive plutonium reprocessing plant and low level nuclear waste disposal site. Based on radionuclide levels in upstream control stations, 137Cs was the only radionuclide whose levels in the creeks downstream of the site could confidently be attributed to the site during this sampling program. This field sampling effort is the first of a three phase program to collect data during low, medium and high flow conditions.

ORNL/TM-6663 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
Evaluation of Selected Predictive Models and Parameters for the Environmental Transport and Dosimetry of Radionuclides.
C. W. Miller, D. E. Dunning, Jr., E. L. Etnier, F. O. Hoffman, and C. A. Little. Jul 79, 101p
Contract W-7405-ENG-26

Evaluations of selected predictive models and parameters used in the assessment of the environmental transport and dosimetry of radionuclides are summarized. Mator sections of this report include a validation of the Gaussian plume disperson model, comparison of the output of a model for the transport of exp 131 I from vegetation to milk with field data, validation of a model for the fraction of aerosols intercepted by vegetation, an evaluation of dose conversion factors for exp 232 Th, an evaluation of considering the effect of age dependency on population dose estimates, and a summary of validation results for hydrologic transport models. (ERA citation 04:052153)

18I. Reactor Engineering and Operation

COO-4066-10 PC **A05**/MF **A01**
Exxon Nuclear Co., Inc., Richland, WA.
Fuel Performance Improvement Program. Quarterly Progress Report, January--March 1979.
C. E. Crouthamel. Apr 79, 89p
Contract EY-76-C-06-1830

Progress in various tasks of the LWR Fuel Performance Improvement Program is summarized. These tasks include the testing and demonstration program, cut-of-reactor experiments, in-reactor experiments, in-reactor demonstrations, and fuel performance evaluations. (ERA citation 04:051438)

DOE/DP-0001-4 PC **A02**/MF **A01**
Department of Energy, Washington, DC. Office of Safeguards and Security.
Semi-Annual Report on Strategic Special Nuclear Material Inventory Differences.
Jul 79, 25p

This report provides and explains the generally small differences between the amounts of nuclear materials charged to DOE facilities and the amounts that could be physically inventoried. This report covers data for the period from April 1, 1978, through September 30, 1978, and includes accounting corrections for data from earlier periods. These data and explanations, together with the absences of physical indications of any theft attempt, support a finding that during this period no theft or diversion of a significant amount of strategic special nuclear materials has occurred. (ERA citation 04:051183)

GA-A-15148 PC **A03**/MF **A01**
General Atomic Co., San Diego, CA.
MINT Computer Program for Numerical Computation of Turbulent Flow: An Overview.
T. E. Burton. May 79, 44p
Contract EY-76-C-03-0167-017

The need to calculate turbulent recirculating flow fields in two or three dimensions arises frequently at General Atomic Company (GA). The MINT finite difference code, recently purchased from Scientific Research Associates (Glastonbury, Connecticut), can often meet this need. In its present form the code solves the full Navier--Stokes momentum transport equations, the mass and energy transport equations, and two additional transport equations which model turbulence. MINT efficiently handles turbulent wall layers and implements most standard boundary conditions with a minimum of user effort. Flow geometries must be simple. Each boundary surface must coincide with a grid point surface, and no reentrant corners are permitted. A program to overcome this latter deficiency is underway. (ERA citation 04:051476)

GA-A-15329 PC **A06**/MF **A01**
General Atomic Co., San Diego, CA.
Core Support Block Thermal Mixing Test Analysis Report.
E. Chin. May 79, 103p
Contract EY-76-C-03-0167-061

The extent of gas mixing and pressure drop within the core support block was experimentally investigated for various geometric and height configurations. These tests were conducted by the Experimental Engineering Branch of General Atomic Company. As a result of this investigation, the core support block thermal mixing and pressure drop has been quantified. Thermal mixing and the temperature sensor accuracy can be substantially improved at the cost of higher pressure drop. A 70-degree miter angle configuration is recommended for the reference design of the HTGR core support block (CSB). The recommended CSB height will depend on further evaluation of the possible range of variations in fuel region reactor conditions to be determmined by the Systems Engineering Department. The average temperature in a rodded region (a region with control rods in the lowered position) can be measured by the temperature sensor to within a 45 exp 0 F accuracy, a big improvement from an early CSB design tested by the Commissariat a La Energie Atomique at Saclay, France in 1974 and 1975. (ERA citation 04:051477)

HEDL-TME-79-28 PC **A08**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Aerosol Behavior During Sodium Pool Fires in a Large Vessel: CSTF Tests AB1 and AB2.
R. K. Hilliard, J. D. McCormack, and A. K. Postma. Jun 79, 160p
Contract EY-76-C-14-2170

Two large-scale aerosol behavior tests, using sodium pool fires as the aerosol source, were performed in the Containment Systems Test Facility (CSTF). The tests were conducted to characterize the properties and behavior of sodium aerosol particles formed and aged in a large containment vessel. The 20-m high, 850-m exp 3 CSTF containment building in regard to parameters that affect agglomeration and gravitational settling. In both tests, sodium burned for one hour in a 4.38-m exp 2 pool, and the only difference between them was that steam was injected during the second test, simulating the release of water vapor from heated concrete. (ERA citation 04:051676)

LA-7521 PC **A09**/MF **A01**
Los Alamos Scientific Lab., NM.
Coordinated Safeguards for Materials Management in a Uranium--Plutonium Nitrate-to-Oxide Coconversion Facility: Coprecal.
H. A. Dayem, D. D. Cobb, R. J. Dietz, E. A. Hakkila, and E. A. Kern. Feb 79, 186p
Contract W-7405-ENG-36

This report describes the conceptual design of an advanced materials-management system for safeguarding special nuclear materials in a uranium--plutonium nitrate-to-oxide coconversion facility based on the Coprecal process. Design concepts are presented for near real-time (dynamic) accountability by forming dynamic materials balances from information provided by chemical and nondestructive analyses and from process-control instrumentation. Modeling and simulation techniques are used to compare the sensitivities of proposed dynamic materials accounting strategies to both abrupt and protracted diversion. The safeguards implications of coconversion as well as some unique features of the reference process are discussed and design criteria are identified to improve the safeguardability of the Coprecal coconversion process. (ERA citation 04:051184)

LA-7914-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Gamma Doses from Irradiated Assemblies under Water.
P. M. Rinard. Jul 79, 32p
Contract W-7405-ENG-36

The gamma doses in a small air-filled ionization chamber near an irradiated assembly under water have been calculated and compared to measurements of BWR and PWR assemblies. It was found that a line source parallel to an assembly's axis

capped by disk sources could represent the assembly in the calculations. For those assemblies exposed to a longitudinally uniform neutron flux, the line source alone was sufficient even for points 30 cm beyond the end of the assemblies. For others that had experienced a stronger neutron flux in their central regions, the disk sources were very important contributors to the doses even 30 cm within the assemblies' ends. The detectability of gaps in a fuel assembly was investigated by showing the changes in the dose profiles along an assembly with a variety of gaps. (ERA citation 04:051439)

NEDC-12691 PC **A05**/MF **A01**
General Electric Co., Pleasanton, CA. Nuclear Technology Dept.
Characterization of the Corrosion Product Films on the Dresden-1 Pilot Loop after Re-Exposure to Reactor Water.
L. D. Anstine, and G. E. Von Nieda. Oct 77, 89p
Contract EY-76-C-02-4014

The chemical and physical properties of the corrosion product oxide films of four pipe and two coupon samples from the Dresden-1 pilot test loop have been measured. The samples represented stainless steel material that had been exposed to reactor water conditions before being chemically cleaned in June 1976 and material added after the loop was chemically cleaned. Twenty days of exposure to reactor water resulted in rapid buildup of radioactivity from the incorporation of high specific activity cobalt into the oxide films created by the corrosion of the stainless steel surfaces. The primary source of the cobalt radioactivity was the fuel deposits. (ERA citation 04:051440)

NUREG/CR-0094 PC **E04**/MF **A01**
Oak Ridge National Lab., TN.
PWR Blowdown Heat Transfer Separate-Effects Program - Thermal-Hydraulic Test Facility Experimental Data Report for Test 166S,
V. D. Clemons, M. D. White, and R. A. Hedrick. May 78, 54p ORNL/NUREG/TM-199
Contract W-7405-eng-26
Document contains 3 sheets of 48X reduction microfiche.

Reduced instrument responses are presented for Thermal-Hydraulic Test Facility (THTF) test 166S, which is part of the ORNL Pressurized-Water Reactor (PWR) Blowdown Heat Transfer Separate-Effects Program. The objective of the program is to investigate the thermal-hydraulic phenomenon governing the energy transfer and transport processes that occur during a loss-of-coolant accident in a PWR system. Test 166S was conducted to obtain thermal-hydraulic and CHF information in THTF bundle 1 with an intact hot leg. The primary purpose of this report is to make the reduced instrument responses during test 166S available. These are presented in graphical form in engineering units and have been analyzed only to the extent necessary to ensure reasonableness and consistency.

NUREG/CR-0469-V-7 PC **A07**/MF **A01**
Sandia Labs., Albuquerque, NM.
Advanced Reactor Safety Research. Volume 7.
Quarterly rept. Apr-Jun 78,
R. L. Coates. Sep 79, 141p SAND78-2001
See also NUREG/CR-0335.

Sandia Laboratories is conducting the Advanced Reactor Safety Research Program on behalf of the U.S. Nuclear Regulatory Commission (NRC). The overall objective of the program is to provide NRC with a comprehensive data base essential to (1) defining key issues, (2) understanding the controlling accident sequences, (3) verifying the complex computer models used in accident analysis and licensing reviews, and (4) assuring the public that advanced power reactor systems will not be licensed and placed in commercial service in the United States without appropriate consideration being given to their effects on health and safety. In 1978, Sandia investigated seven areas of interest related to NRC needs: energetics, fuel dynamics, core debris behavior - inherent retention, aerosol source normalization, elevated temperature design assessment, LMFBR accident delineation, and test and facility technology. These major tasks are subdivided as necessary to facilitate the organization of work into a body of coherent information which supports the requirements of the NRC. The progress in each of these areas is presented.

NUREG/CR-0777 PC **A09**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
A Digraph-Fault Tree Methodology for the Assessment of Material Control Systems.
Technical rept.,
H. E. Lambert, J. J. Lim, and F. M. Gilman. Nov 79, 177p UCRL-52710

The Lawrence Livermore Laboratory is developing a procedure to assess the effectiveness of material control and accounting systems at nuclear fuel cycle facilities. The purpose of a material control and accounting system is to prevent the theft of special nuclear material such as plutonium or highly enriched uranium. This report presents the use of a directed graph and fault tree analysis methodology in the assessment procedure. This methodology is demonstrated by assessing a simulated material control system design, the Test Bed.

NUREG/CR-0927 PC **E10**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
Experiment Data Report for PBF/LOFT Lead Rod Test Series (Tests LLR-S0, -3, -4, -4A, and -5),
Russell J. Buckland, and David H. Schwieder. Nov 79, 375p
Contract DE-AC07-76IDO1570
Document contains 1 sheet of 48X reduction microfiche.

Recorded test data are presented for Tests LLR-SO, LLR-3, LLR-4, LLR-4A, and LLR-5 of the Thermal Fuels Behavior Program PBF/LOFT Lead Rod (LLR) Test Series. This test series, conducted in the Power Burst Facility, was designed to provide a parametric evaluation of the expected mechanical response of the LOFT fuel rods to a loss of coolant event. The data, presented in the form of graphs in engineering units, have been analyzed only to the extent necessary to ensure they are reasonable and consistent. These uninterpreted data from the LLR tests are presented in advance of detailed analysis and interpretation.

NUREG/CR-1002 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Uranium and Sodium Oxide Aerosol Experiments: NSPP Tests 201-203 and Tests 301-302, Data Record Report,
R. E. Adams, J. T. Han, T. S. Kress, and L. F. Parsly, Jr. Nov 79, 89p ORNL/NUREG/TM-343
Contract W-7405-eng-26

This data record report summarizes the first three uranium oxide aerosol tests and two preliminary mixed uranium oxide-sodium oxide aerosol tests conducted in the Nuclear Safety Pilot Plant project at Oak Ridge National Laboratory. The goal of the project is to establish the validity (or level of conservatism) of the aerosol behavioral code, HAARM-3, and follow-on codes under development at the Battelle Columbus Laboratories for the U.S. Nuclear Regulatory Commission. Included in the report are descriptions of the five tests, together with tables and graphs summarizing the results.

ORNL-5229/R1 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Input Data Requirements for Special Processors in the Computation System Containing the VENTURE Neutronics Code.
D. R. Vondy, T. B. Fowler, and G. W. Cunningham. Jul 79, 51p
Contract W-7405-ENG-48

User input data requirements are presented for certain special processors in a nuclear reactor computation system. These processors generally read data in formatted form and generate binary interface data files. Some data processing is done to convert from the user oriented form to the interface file forms. The VENTURE diffusion theory neutronics code and other computation modules in this system use the interface data files which are generated. (ERA citation 04:051515)

ORNL-5536 PC **A11**/MF **A01**
Oak Ridge National Lab., TN.
Gas-Cooled Reactor Programs: High-Temperature Gas-Cooled Reactor Base-Technology Program. Annual Progress Report for Period Ending December 31, 1978.
F. J. Homan, and P. R. Kasten. Jun 79, 246p
Contract W-7405-ENG-26

Progress in HTGR studies is reported in the following areas: fission product transport and coolant impurity effects, fueled graphite development, PCRV development, structural materials, characterization and standardization of graphite, and evaluation of the pebble-bed type HTGR. (ERA citation 04:051482)

UCID-18127 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Summary of Boiling Water Reactor Licensees' Commitments to Install Recirculation Pump Trip Systems.
V. R. Latorre. Jul 79, 23p
Contract W-7405-ENG-48

This report summarizes the commitments of boiling water reactor Licensees to a request by the US Nuclear Regulatory commission for the installation of recirculation pump trip systems in those nuclear power plants that do not currently have such systems. The Licensee's schedules for system implementation, emergency procedures development, and operator training are reviewed. (ERA citation 04:051713)

18J. Reactor Materials

GA-A-15343 PC **A07**/MF **A01**
General Atomic Co., San Diego, CA.
HTGR Fuel Reprocessing Pilot Plant: Results of the Sequential Equipment Operation.
J. B. Strand, D. E. Fields, and C. A. Kergis. May 79, 130p
Contract AT03-76SF71053

The second sequential operation of the HTGR fuel reprocessing cold-dry head-end pilot plant equipment has been successfully completed. Twenty standard LHGTR fuel elements were crushed to a size suitable for combustion in a fluid bed burner. The graphite was combusted leaving a product of fissile and fertile fuel particles. These particles were separated in a pneumatic classifier. The fissile particles were fractured and returned in a fluid bed to remove the inner carbon coatings. The remaining products are ready for dissolution and solvent extraction fuel recovery. (ERA citation 04:051155)

GA-A-15377 PC **A03**/MF **A01**
General Atomic Co., San Diego, CA.
Use of Spikants in HTGR Fuel and Their Effect on Costs.
L. H. Brooks. May 79, 30p
Contract EY-76-C-03-0167-017

The costs of fresh fuel fabrication have been estimated for flowsheets that have spikant added (Co-60) at various points. The costs are compared with refabricated and fresh fuel fabrication costs. It is shown that the costs increase as the spikant is added nearer to the plant feed point. The least cost is achieved by adding a detachable spikant to the finished fuel element. The highest cost is incurred when the spikant is fed in with the plant feed. This cost is greater than that for refabricated fuel because extra process cells are necessary to prepare the spikant and, in addition, the gamma flux from the Co-60 is much greater than from U-232 and greater precautions have to be taken. (ERA citation 04:051479)

LA-7891-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Tomographic Visualization of Stress Corrosion Cracks in Tubing.
R. A. Morris, R. P. Kruger, and G. W. Wecksung. Jun 79, 10p
Contract W-7405-ENG-36

A feasibility study was conducted to determine the possibility of detecting and sizing cracks in reactor cooling water tubes using tomographic techniques. Due to time and financial constraints, only one tomographic reconstruction using the best tech-

nique available was made. The results indicate that tomographic reconstructions can, in fact, detect cracks in the tubing and might possibly be capable of measuring the depth of the cracks. Limits of detectability and sensitivity have not been determined but should be investigated in any future work. (ERA citation 04:051558)

ORNL/TM-6685 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
Evaluation of Fuel Fabrication and the Back End of the Fuel Cycle for Light-Water- and Heavy-Water-Cooled Nuclear Power Reactors.
W. L. Carter, and A. R. Olsen. Jun 79, 115p
Contract W-7405-ENG-26

The classification of water-cooled nuclear reactors offers a number of fuel cycles that present inherently low risk of weapons proliferation while making power available to the international community. Eight fuel cycles in light water reactor (LWR), heavy water reactor (HWR), and the spectral shift controlled reactor (SSCR) systems have been proposed to promote these objectives in the International Fuel Cycle Evaluation (INFCE) program. Each was examined in an effort to provide technical and economic data to INFCE on fuel fabrication, refabrication, and reprocessing for an initial comparison of alternate cycles. The fuel cycles include three once-through cycles that require only fresh fuel fabrication, shipping, and spent fuel storage; four cycles that utilize denatured uranium--thorium and require all recycle operations; and one cycle that considers the LWR--HWR tandem operation requiring refabrication but no reprocessing. (ERA citation 04:051540)

RHO-ST-22 PC **A03**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
High-Accuracy Determination of Uranium in Concentrated, Relatively Pure Solutions of Uranyl Nitrate.
J. R. Jewett. Dec 78, 29p
Contract EY-77-C-06-1030

A highly accurate gravimetric assay procedure has been developed and evaluated to verify uranium concentrations in standard solutions of uranyl nitrate. This procedure, based on quantitative conversion of uranium to stoichiometric U sub 3 O sub 8 , has been shown to yield a relative precision of +-0.08% for a single determination at the 95% confidence limit. No bias can be detected. (ERA citation 04:051187)

18K. Reactor Physics

PNL-3086 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
MCDAN: A Monte Carlo Computer Code for Calculating the Dancoff Correction Factor for Spheres and Rods.
J. P. McNeece, T. J. Trapp, and J. K. Thompson. Aug 79, 24p
Contract EY-76-C-06-1830

MCDAN is a computer code that uses Monte Carlo techniques to calculate the Dancoff correction factor for arrays of spheres or rods. Neutrons are started from the surface of the sphere (rod) and tracked until they intersect another sphere (rod). The histories of a number of neutrons are statistically combined to give a value for the Dancoff correction factor. MCDAN was written as a tool to verify the accuracy of an expression for the Dancoff correction factor used in a study of the reactivity effect of fuel particles in uranium--water mixtures. The accuracy of MCDAN has been verified by comparison with tabulated data for systems of two spheres. (ERA citation 04:051552)

18N. Snap Technology

LA-7952-PR PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
General-Purpose Heat Source Project, Space Nuclear Safety Program, and Radioisotopic Terrestrial Safety Program. Progress Report, May 1979.
W. J. Maraman. Jul 79, 43p
Contract W-7405-ENG-36

The formal monthly report covers the studies related to the use of exp 238 PuO sub 2 in radioisotopic power systems carried out for the Advanced Nuclear Systems and Projects Division of the Los Alamos Scientific Laboratory. Research progress is reported on: (1) General-Purpose Heat Source Development; (2) Space Nuclear Safety; and (3) Radioisotopic Terrestrial Safety. (ERA citation 04:051192)

ORNL/TM-6687 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Testing of Bellows for Engineering Systems. Part 1.
H. E. McCoy, Jr. Jul 79, 43p
Contract W-7405-ENG-26

Bellows made of Hastelloy X and Type 347 stainless steel will be used in the Brayton Isotope Power System (BIPS). Development of this system will involve the Work Horse Loop (WHL) and the Ground Demonstration System (GDS). The primary function of these bellows is to accommodate relative movement of parts of the system, which results from differential temperatures. Methods for performing several types of tests on metal bellows have been developed. Three Hastelloy X bellows were subjected to low-cycle fatigue tests, and their failure times were very close to those predicted by the designer. The failures were largely intergranular and typical of the type expected at elevated temperatures. (ERA citation 04:051193)

19. ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

AD-A075 177/6 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
News in Aero-Science and Technology.
15 May 79, 15p Rept no. FTD-ID(RS)T-0581-79
Edited trans. of Hang K'ung Chih Shih (China) n11 p22-23 Nov 78, by H. P. Lee.

No abstract available.

AD-A075 238/6 PC **A03**/MF **A01**
Harry Diamond Labs Adelphi Md
The High-Spin Tabletop Artillery Simulator (2 in.).
Technical rept.,
Donald J. Mary. Sep 79, 35p Rept no. HDL-TR-1900

The High-Spin Tabletop Artillery Simulator (2 in.) is a device for testing fuze power supplies. The tester was designed to provide in the laboratory the setback, angular acceleration, and centrifugal forces required to activate the M732 fuze power supply (PS115). Setback forces of 5000 g and spin rates of 300 rps are produced. The tester is partially automatic and provides a readout system for monitoring the power-supply output voltage. The tester and its performance characteristics are described. (Author)

AD-A075 340/0 PC **A05**/MF **A01**
Army Armament Research and Development Command Dover NJ Large Caliber Weapon Systems Lab
Kinetic Studies and Product Characterization during the Basic Hydrolysis of Glyceryl Nitrate Esters.
Technical rept.,
C. Capellos , W. J. Fisco , C. Ribaudo , V. D. Hogan , and J. Campisi. Aug 79, 98p ARLCD-TR-79022, AD-E400 341
Contract IAO-6749

Kinetics of the basic hydrolysis of glyceryl trinitrate (TNG), 1,2-glyceryl dinitrate (1,2-DNG), 1,3-glyceryl dinitrate (1,3-DNG), 1-glyceryl mononitrate (1-MNG) and 2-glyceryl mononitrate (2-MNG) were investigated in CO2-free aqueous calcium hydroxide solutions. The hydrolysis reactions were carried out in a temperature controlled reactor vessel with provision for continuous N2 sparging of the reaction mixture. All glyceryl nitrate esters hydrolysed via second order reaction at 25 C. The activation energy of the TNG hydrolysis reaction was calculated from kinetic data at 10 C, 18 C, and 25 C. The 2-MNG and 1,2-DNG in basic solutions isomerized to 1-MNG and 1,3-DNG, respectively, which subsequently hydrolysed to yield products. The main hydrolysis product in the case of 1,3-DNG was identified as glycidyl nitrate.

AD-A075 573/6 PC **A03**/MF **A01**
Naval Surface Weapons Center White Oak Lab Silver Spring Md
Overviews on HNS Production/Properties/Applications.
Progress rept. 1 Jan 77-1 Jan 79,
E. Eugene Kilmer. 6 Jul 79, 30p Rept no. NSWC/TR-79-181

Hexanitrostilbene (HNS) has been used within the U.S. government/industrial complex since the early 1960's. Chemical process variables leave much to be desired in terms of product purity and control of particle geometry. The explosive HNS-I, from the Shipp process, is normally fine, flat platelets which have been found to contain upwards to 6% hexanitrobibenzyl (HNBiB) or dipicrylethane (DPE) as an impurity. Attempts to remove this impurity by multiple washings has resulted in recrystallized material of a new geometry and consequently larger particle size. The large particle size is undesirable in many applications. The explosive HNS-II, first recrystallized by the Taylor-Oesterling process, is usually accomplished by extraction by dual-organic solvents. Most recently, HNS has been recrystallized from nitric acid. The thermal stability of the HNS recrystallized from nitric acid appears to be different from the HNS recrystallized from organic solvents as demonstrated in the low core load detonating cords. The chemical/explosive properties will be discussed.

MHSMP-79-37 PC **A03**/MF **A01**
Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX.
Substitute Potting Compounds for Sylgard 93-120. Process Development Endeavor Nos. 203 and 207.
G. L. Flowers, and S. T. Switzer. Jul 79, 26p
Contract EY-76-C-04-0487

The report deals with the development of substitute potting compounds to replace the no longer available Dow Corning 93-120. Three different approaches to formulate a substitute, two of which were successful are presented. The efforts discussed are a part of a laarger project to better understand the silicone potting compound technology and to formulate substitutes for specific materials which have been discontinued by Dow Corning. (ERA citation 04:052123)

MHSMP-79-39 PC **A02**/MF **A01**
Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX.
Analysis of TATB/Phenoxy Formulations by HSLC. Process Development Endeavor No. 210.
A. C. Teter. Aug 79, 6p
Contract EY-76-C-04-0487

Analysis of the phenoxy binder in TATB/phenoxy formulations was performed by high speed liquid chromatography. The separation was made on a LiChrosorb SI-60 column (25 cm) using tetrahydrofuran as the mobile phase and uv detector for quanitation. (ERA citation 04:052124)

UCRL-52776 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Nitrate Ester Decomposition and Degradation of Molecular Weight in Nitrocellulose from Thermal Decomposition of PBX-9404 Below 100 exp 0 C.
H. R. Leider, and D. L. Seaton. 8 May 79, 15p
Contract W-7405-ENG-48

The thermal decomposition of nitrate ester (-ONO sub 2) in the nitrocellulose (NC) binder of PBX-9404 was studied. Evidence was found that the tri-esterified NC subunits decompose most readily; by calculating the relative populations of mono-, di-, and tri-esterfied subunits and monitoring NC composition as a function of (-ONO sub 2) loss, the extent of degradation of the NC molecular weight was estimated. Decomposition of (-ONO sub 2) obeyed second-order kinetics, and the activation energy for decomposition (26.1 kcal/mol) agreed with values calculated on the basis of weight loss

or the amount of evolved gas. (ERA citation 04:052126)

19C. Combat Vehicles

AD-A075 374/9 PC **A04**/MF **A01**
Vought Corp Dallas Tx
Design Feasibility Analysis of Fiber Reinforced Composite Army Tank Track Connector Link.
Final rept. 1 Oct 78-1 Jun 79,
E. G. Smith , G. Bourland , R. N. Rainey , and O. L. Mijares. Jun 79, 72p 2-53500/9R-52234, AMMRC-TR-79-41
Contract DAAG46-78-C-0069

This report documents the baseline definition, material, design, and manufacturing analyses performed on an Army Tank Track Connector Link. Significant technical issues were identified and potential solutions recommended for further study. The selected design was chosen from a trade study of several potential concepts. These design concepts and detailed results of the trade study are presented. Structural analysis and design was performed on the selected concept to establish predicted performance. Cost analyses were also conducted to determine production costs. (Author)

AD-A075 589/2 PC **A07**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Oh School of Systems and Logistics
Improving the Preventive Maintenance Checks and Services Program for the M60A1 Main Battle Tank.
Master's thesis,
Lynn A. Frick , and Roland E. Sasser, Jr. 7 Sep 79, 142p Rept no. AFIT-LSSR-15-79B

The major cornerstone of the Army maintenance program for the M60A1 tank is the preventive maintenance checks and services. One significant problem area is that the Army has not provided the maintenance manager with a usable systemic approach to planning and managing a viable, ongoing preventive maintenance checks and services program. The objectives of this research were to develop realistic time estimates for the individual tasks included in the preventive maintenance checks and services and to integrate those time estimates into a network model to be used for planning and monitoring the preventive maintenance checks and services. A network model of the scheduled service and individual task time estimates are presented along with the results of the survey questionnaire which was used in developing the network model and individual time task estimates. The conclusion of the research was that a viable useable maintenance planning model should be implemented to assist the maintenance manager. Recommendations and areas for further study are presented. (Author)

19D. Explosions, Ballistics, and Armor

AD-A075 110/7 PC **A03**/MF **A01**
Army Missile Command Redstone Arsenal Al Technology Lab
A Coupled Interior Ballistics Finite Element Combustion Instability Analysis Procedure. Part II.
Technical rept.,
Robert M. Hackett. 26 Jun 79, 40p Rept no. DRDMI-T-79-68
See also Part 1 dated 14 Jul 78, AD-A060 554.

A computer code is formulated which provides the solid propellant grain designer with the capability of performing an interior ballistics analysis while, with a minimum amount of additional effort, at the same time performing a combustion instability prediction analysis at any designated point in time during the entire period of performance. The program, in effect, couples the output of an existing solid propellant grain design evaluation code, which predicts the acoustic chamber geometry during surface regression, with the input to the existing three-dimensional finite element combustion instability prediction code, FLAP3. The three-dimensional finite element mesh and boundary conditions are generated from the grain surface regression data for the progressive burn times. The entire finite element mesh and boundary condition generation by FLESH3, the companion to FLAP3, is executed with the input of seven geometry parameters, which are obtained from the ballistics code output, and the corresponding burn depth parameter. The use of the developed program is demonstrated for three different values of burn depth for the case of a typical star design. (Author)

AD-A075 326/9 PC **A08**/MF **A01**
Gough (Paul) Associates Inc Portsmouth N H
Two Dimensional Convective Flamespreading in Packed Beds of Granular Propellant.
Final rept. Nov 77-Feb 79,
Paul S. Gough. Jul 79, 159p PGA-TR-79-1, ARBRL-CR-00404, AD-E430 304
Contract DAAK11-78-C-0003

A theoretical model is described for the digital simulation of flamespreading and pressure-wave propagation in axisymmetric, two dimensional propelling charges. The approach recognizes explicitly the presence of internal boundaries defined by jumps in porosity and allows for treatment of the influence of bag materials, liners, and additives on flamespreading. As one step toward the implementation of this model, a technique of numerical solution is presented for a geometrically complex region of two dimensional, two phase flow. Solutions are presented for three problems based on nominal data. (Author)

AD-A075 365/7 PC **A03**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground Md Ballistics Research Lab
Free-Flight Base Pressure Measurements on 8 deg Cones.
Technical rept.,
Andrew Mark. Jul 79, 26p ARBRL-TR-02179, AD-E430 301

Base pressure measurements are presented on two 8 deg half angle, right circular cones with a tip bluntness ratio of 1%. Data are obtained at three radical base locations: r/R sub b = 0, r/R sub b = .5, and r/R sub b = .917. A unique free-flight technique was employed to obtain the data. The cones were launched nearly vertically from special guns and the data were telemetered to ground stations. The launch Mach numbers were approximately 3 with corresponding Reynolds numbers of 35 million. Both the Mach number and the Reynolds number decreased monotonically from their launch value reaching 400 and 250,000 respectively at apogee. In the laminar flow regime, the centerline base pressure is measured to be a few percent higher than either of the other two. At early times in the trajectory, where the boundary layer was expected to be turbulent, the opposite effect is noted.

19E. Fire Control and Bombing Systems

AD-A075 381/4 PC **A15**/MF **A01**
American Inst for Research Washington Dc
M60A1 AOS Tank Gunnery Data Handbook
Technical rept. Jan 75-Sep 78,
John A. Boldovici , G. Gary Boycan , Paul W. Fingerman , and George R. Wheaton. Mar 79, 335p AIR-55800-9/78-TR, ARI-TR-79-A7
Contract DAHC19-76-C-0003

This report briefly reviews the methods used in developing a model test of tank crew marksmanship and presents the detailed task analysis data base developed in the course of that effort. Descriptions are included of 266 job objectives that represent all of the ways an M60A1AOS tank is capable of engaging a threat target under current doctrine. Each objective is described in terms of the conditions of the engagement and the precise behaviors which each crew member must perform. The objectives are organized into clusters which are homogeneous in content, thus facilitating the use of the data base for development of training programs, design and evaluation of training devices, and test development. Also included are computing algorithms and program listings for measuring certain characteristics of engagements, including behavioral generalizability (the extent to which performance on one specific engagement may predict performance on others) and behavioral coverage (the extent to which all possible tank crew behaviors are represented by a subset of engagements).

19F. Guns

AD-A075 322/8 PC **A03**/MF **A01**
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
Gun Tube Manufacture by Automation.
Memorandum rept.,
C. LaRoss. Jun 79, 26p ARLCB-MR-79011, AD-E440 040

This report describes three areas of the production line in manufacture of gun tubes that, with improvement, would be beneficial to gun tube manufacture by automation. The purpose of the project was to highlight and improve these areas to result in an improved gun tube manufacturing facility. (Author)

AD-A075 341/8 PC **A03**/MF **A01**
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
Application of Rapid Heat Treating to Cannon Tubes.
Memorandum rept.,
P. A. Thornton. Jun 79, 35p ARLCB-MR-79009, AD-E440 045

In order to demonstrate the feasibility of shortened heat treatment cycles for gun tubes, eight forgings (four 105mm M68 and four 155mm M185) were subjected to reduced austenitizing and tempering times. Austenitizing time was held to 30 minutes at temperature as measured by thermocouples. Quenching was accomplished by either vertical immersion, horizontal immersion or horizontal spray. The results showed that accepted mechanical properties could be attained with these shortened cycles. However, the shortened cycles must be established for a particular component with consideration for material variation, especially chemical segregation, which seriously affects transformation behavior. Nevertheless, in view of the present and future costs of firing heat treat furnaces and the potential increase in production capacity, reduced heating times can be highly significant. (Author)

AD-A075 342/6 PC **A03**/MF **A01**
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
A Short Study of Large Rotary Forged Cylinders.
Memorandum rept.,
F. Heiser. Jun 79, 38p ARLCB-MR-79013, AD-E440 041

The Integrated Forging Line was used to produce steel for the Advanced Breech Technology program. Cylinders were rotary forged from cast hollow ESR and from vacuum degassed steel. Anomalies in the data prompted a more detailed metallurgical study. The results are presented. Satisfactory properties were produced from the vacuum degassed steel. However, the very light forging reduction coupled with the very rapid and short austenitizing inherent in the Selas heat treatment system were inadequate to develop satisfactory properties in the cast ESR steel. (Author)

AD-A075 343/4 PC **A02**/MF **A01**
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
Effects of Processing Variables on Erosion of Gun Tubes.
Memorandum rept.,
J. Passmore. Jun 79, 19p ARLCB-MR-79015, AD-E440 042

A reduction in silicon with an associated increase in molybdenum is known to increase the wear life of gun steel when fired under subscale firing conditions. However, when this same material is employed in a full scale firing test utilizing the 105-mm M-68 gun tube, the wear life of the tube, as measured at the origin of rifling (i.e. OR), remains the same regardless of silicon and molybdenum content. A few inches beyond the OR (27 inches from

the rear face of the tube and beyond), the results of the full scale firing test agree with the results of the subscale firing tests, in that the low silicon steel exhibits a lower erosion rate than for a normal gun steel composition. (Author)

AD-A075 364/0 PC **A04**/MF **A01**
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
Index to Benet Weapons Laboratory (LCWSL) Technical Reports - 1978.
Special rept.,
B. Rahrer. Jun 79, 53p ARLCB-SP-79012, AD-E440 037
See also AD-A056 107.

This is a compilation of technical reports published during 1978. (Author)

AD-A075 493/7 PC **A07**/MF **A01**
Army Infantry School Fort Benning Ga
Small Arms Handbook WS - 1.
Jan 66, 145p

Small Arms Handbook: Rifle marksmanship; Special purpose weapons; Machinegun 7.62mm, M60 and browning machinegun caliber .50, HB, M2; and Rifle squad technique of fire.

19G. Rockets

AD-A075 384/8 PC **A02**/MF **A01**
New Mexico State Univ Las Cruces Physical Science Lab
Sounding Rocket and Balloon Systems Support.
Final rept. 15 Jun 76-15 Jun 79,
Raymond A. Bumgarner , and Arthur A. Gilcrease. 18 Jul 79, 6p PS00945, AFGL-TR-79-0166
Contract F19628-76-C-0171

The work performed under this contract consisted of the following; integrate, calibrate, and test, GFE range safety radar tracking beacon and parachute recovery systems; design and develop special devices as required, operate and maintain GFE telemetry station to support telemetry operations at WSMR, New Mexico, and calibrate equipment and perform analyses for air sampling balloon flights conducted at Holloman AFB, New Mexico. (Author)

20. PHYSICS

20A. Acoustics

AD-A075 035/6 PC **A02**/MF **A01**
Rome Air Development Center Hanscom AFB Ma Deputy for Electronic Technology
A New Surface-Acoustic Wave Cut of Quartz with Orthogonal Temperature-Compensated Propagation Directions,
Robert M. O'Connell. 23 Apr 79, 5p Rept no. RADC/ETR-79-0016
Pub. in Applied Physics Letters, v35 n3 p217-219, 1 Aug 79.

No abstract available.

AD-A075 201/4 PC **A03**/MF **A01**
Cambridge Acoustical Associates Inc Ma
Structure-Borne Noise and Sound Radiation Associated with a Point Driven Grid Supported Infinite Plate.
Final rept.,
W. T. Ellison , and J. M. Garrelick. Feb 79, 45p Rept no. CAA-U-600-260
Contract N00014-78-C-0218

A general solution has been developed for the transform responses and the radiated pressure associated with a fluid loaded, orthogonal grid supported plate driven by a harmonic point force. For the case of light or no fluid loading the solution is in a closed form. A particular interest in developing this solution was to determine the structural passband characteristics of such a structure in terms of the inertial and elastic properties of the beams composing the grid as well as the plate itself. It is shown that at any given frequency there always exist some set of structural wave numbers (kx, ky) that represent freely propagating waves. This result is in contrast to previous one-dimensional analyses that result in specific tests of propagating and nonpropagating bands. The nature of the response of the structure as a function of frequency is provided in terms of the various inertial and elastic properties of the structure, and an analogy is drawn with the one-dimensional result in terms of propagating wave number sets being confronted with an inertial or compliant impedance. The analogy results in the propagating pass bands flipping about the one-dimensional clamped-clamped resonant frequencies.

AD-A075 462/2 PC **A10**/MF **A01**
Texas Univ At Austin Applied Research Labs
An Examination of Coupled Mode Theory as Applied to Underwater Sound Propagation.
Technical rept.,
Steven Ross Rutherford. 26 Jul 79, 224p Rept no. ARL-TR-79-44
Contract N00014-78-C-0113

The work presented in this dissertation is a theoretical investigation of the mathematical formalism of coupled mode theory as applied to underwater sound propagation in a range dependent, ocean environment. The range dependence of an acoustic medium may be characterized by two types, range variability of the geoacoustic parameters such as sound speed and range variability of the boundary conditions. This dissertation focuses on both types of range variation and examines coupled mode theory and its various approximations with respect to the range variability of the ocean bottom. There are two approximations that arise in applications of coupled mode theory. The adiabatic approximation, which becomes valid in the limit of slight range variability of the medium, involves the neglect of the mode-mode energy coupling process. Another approximation which is inherent in the theory involves a boundary condition approximation which must be made in applications involving range variable boundaries. The adiabatic approximation is examined with respect to its validity as a function of sediment type and bottom range variability (bottom slope and radial sound speed gradient). The raypath properties of the adiabatic approximation are also examinded with respect to the multipath conversion process caused by a sloping bottom and are shown to agree with a ray theory view of the process.

AD-A075 482/0 PC **A03**/MF **A01**
Naval Underwater Systems Center New London Ct New London Lab
Workshop on Communications in Fading Dispersive Medium, 5-6 June 1979.
Technical document,
Azizul H. Quazi. 31 Jul 79, 29p Rept no. NUSC-TD-6107

This document contains the abstracts of papers presented at the 'Workshop on Communications in Fading Dispersive Medium' held on 5, 6 June 1979 at the Naval Underwater Systems Center, New London Laboratory, New London, Connecticut. It was jointly sponsored by the Naval Underwater Systems Center and the Communications System Discipline Committee of IEEE Communications Society. (Author)

N79-32975/1 PC **A03**/MF **A01**
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
Applications of the Modulation Transfer Function in Room Acoustics.
T. Houtgast, and H. J. M. Steeneken. 1978, 32p IZF-1978-19, TDCK-71457

The modulation transfer function (MTF) quantifies the limitations of an auditorium in transmitting speech from the speaker's position to a listener. The way in which any given MTF can be converted into an index (Speech Transmission Index) which correlates well with the mean intelligibility score obtained with speakers and listeners is described. The question of how to calculate the (expected) MTF from the general specifications of an auditorium available in the design stage is then examined. This technique may be applied as a tool in auditorium design. Finally, the way in which the MTF can be measured in actual conditions which provides a direct reading in terms of speech intelligibility is shown.

N79-33375/3 PC **A03**/MF **A01**
Hersh Acoustical Engineering, Chatsworth, Calif.
Effects of Refraction by Means Flow Velocity Gradients on the Standing Wave Pattern in Three-Dimensional, Rectangular Waveguides.
A. S. Hersh. Jun 79, 48p NASA-CR-159108
Contract NAS1-15311

The influence of a mean vortical flow on the connection between the standing wave pattern in a rectangular three dimensional waveguide and the corresponding duct axial impedance was determined analytically. The solution was derived using a perturbation scheme valid for low mean flow Mach numbers and plane wave sound frequencies. The results show that deviations of the standing wave pattern due to refraction by the mean flow gradients are small.

N79-33967/7 PC **A04**/MF **A01**
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
An Experimental Study of the Noise Generating Mechanisms in Supersonic Jets.
Final Report, 15 Nov. 1977 - 31 Oct. 1979.
D. K. Mclaughlin. 31 Oct 79, 67p NASA-CR-162343
Grant NSG-1467

Flow fluctuation measurements with normal and X-wire hot-wire probes and acoustic measurements with a traversing condenser microphone were carried out in small air jets in the Mach number range from M = 0.9 to 2.5. One of the most successful studies involved a moderate Reynolds number M = 2.1 jet. The large scale turbulence properties in the jet, and the noise radiation were characterized. A parallel study involved similar measurements on a low Reynolds number M = 0.9 jet. These measurements show that there are important differences in the noise generation process of the M = 0.9 jet in comparison with low supersonic Mach number (M = 1.4) jets. Problems encounted while performing X-wire measurements in low Reynolds number jets of M = 2.1 and 2.5, and in installing a vacuum pump are discussed.

PB80-107246 PC **A07**/MF **A01**
California State Dept. of Transportation, Sacramento. Office of Transportation Lab.
Noise Measurement and Quality Assurance.
Final rept. 1977-79,
Roger D. Smith, and Mas M. Hatano. Mar 79, 131p TL-657253, FHWA/CA-79/06

A quality assurance program was developed for calibration of noise measurement equipment and the certification of personnel responsible for making noise measurements. The program is designed for use by the eleven Districts and the Transportation Laboratory of the California Department of Transportation (Caltrans). An evaluation of various equipment calibration program alternatives was made and the most suitable to Caltrans' needs was selected and developed in detail. This program involves a mobile calibration and operator testing set-up that can be taken to each District office on an annual basis. Traceability to the National Bureau of Standards (NBS) is established by using standard microphones periodically calibrated by NBS.

20B. Crystallography

AD-A075 065/3 PC **A06**/MF **A01**
Honeywell Corporate Technology Center Bloomington Mn
Growth of Single Crystal Gallium Phosphide by Liquid Phase Epitaxy and Synthesis Solute Diffusion.
Final technical rept. 1 Apr 77-30 Sep 78,
P. E. Petersen , R. G. Schulze , and S. R. Peterson. Apr 79, 121p HR-47108, AFML-TR-79-4049
Contract F33615-77-C-5043

The objective of this research program was to further develop the synthesis-solute-diffusion (SSD) and liquid-phase epitaxy (LPE) techniques for the growth of high-quality gallium phosphide. This program resulted in the growth of epitaxial layers of GaP which had excellent growth morphology and carrier concentrations approximately 3 over 5 x 10 to the 15 power. The SSD technique was ad-

vanced so that low dislocation density bulk GaP could be grown. Carbon was identified as the principal acceptor in this material which limited the carrier concentration to approximately 3 over 2 x 10 the 16 power. An extensive materials evaluation program was conducted as a part of this development. The morphology of the grown material was analyzed by optical and electron-microscopic techniques. Hall and resistivity analysis was used to determine the majority carrier transport properties. The carrier concentration profiles were determined by capacitance-voltage measurements. The deep levels were investigated by photocapacitance spectroscopy, and the minority carrier diffusion lengths were measured by the Schottky-barrier photo current technique. (Author)

AD-A075 514/0 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Enhanced Heteroepitaxy.
Semiannual technical summary 1 Jul-31 Dec 78,
Alan L. McWhorter. 31 Dec 78, 13p ESD-TR-79-193
Contract F19628-78-C-0002, ARPA Order-3336

Uniform crystallographic orientation of silicon films, 500 nanometers thick, has been achieved on amorphous fused silica substrates by laser crystallization of amorphous silicon deposited over surface-relief gratings etched into the substrates. The gratings had a square-wave cross section with a 3.8 micrometers spatial period and a 100-nanometers depth. The less than 100 more than directions in the silicon were parallel to the grating and perpendicular to the substrate plane. We propose that orientation of overlayer films induced by artificial surface patterns be called graphoepitaxy. (Author)

N79-34051/9 PC **A02/MF A01**
Guests Associates, Inc., Huntsville, Ala. Advanced Materials Div.
Crystal Growth Configuration Thermal Analysis.
Final Technical Report.
L. R. Holland, and T. A. Whitt. 30 Sep 79, 24p NASA-CR-161317, AMD-79-TR2
Contract NAS8-33204

Thermal analysis of selected crystal growth systems being considered for space processing is presented. The physical problems associated with the growth of single crystals from solid solution systems are discussed. Special furnace configurations (suitable geometries and growth conditions) for producing high thermal gradients and stable liquid-solid interface shapes required for crystal growth are investigated.

PB80-110364 PC **A09/MF A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
Standard X-Ray Diffraction Powder Patterns. Section 16 - Data for 86 Substances.
Final rept.,
Marlene C. Morris, Howard F. McMurdie, Eloise H. Evans, Boris Paretzkin, and Johan H. de Groot. Oct 79, 190p NBS-MONO-25-SECT-16
See also report dated Oct 78, PB-287 182. Prepared in cooperation with Joint Committee on Powder Diffraction Standards, Swarthmore, PA. Library of Congress catalog card no. 53-61386.

Standard x-ray diffraction patterns are presented for 87 substances. Fifty-nine of these patterns represent experimental data and 28 are calculated. The experimental x-ray powder diffraction patterns were obtained with an x-ray diffractometer. All d-values were assigned Miller indices determined by comparison with computed interplanar spacings consistent with space group extinctions. The densities and lattice constants were calculated and the refractive indices were measured whenever possible. The calculated x-ray powder diffraction patterns were computed from published crystal structure data. Both peak height and integrated intensities are reported for the calculated patterns.

20C. Electricity and Magnetism

AD-A075 146/1 PC **A05/MF A01**
Vanderbilt Univ Nashville TN Dept of Physics and Astronomy
Application of Sensitivity Vectors to the Measurement and Modelling of Magnetostatic Fields.
Research and development rept.,
John P. Wikswo, Jr. Sep 79, 80p DTNSRDC/PAS-79/1
Contract N00167-77-M-8018

The purpose of this report is to develop the analytic techniques required for quantitative assessment of the sensitivity of magnetic field measurements to quasi-static magnetic sources. To do this, we first use the concept of the gradient vector to define a 'sensitivity vector' for a given field measurement, and then relate this vector to the results obtained from the reciprocity theorem of electromagnetism. The derivations are then extended from magnetic dipoles to higher order moments. Several non-linear cases are examined, and techniques are developed to account for the presence of noise. (Author)

20D. Fluid Mechanics

AD-A075 032/3 Not available NTIS
Illinois Univ At Urbana-Champaign Dept of Mechanical and Industrial Engineering
Hydrodynamic Solution for Incompressible Flow as Influenced by Gravitation,
W. L. Chow , T. Han , and C. Wu. 31 Mar 78, 2p ARO-13510.6-E
Grant DAAG29-76-G-0199
Availability: Pub. in AIAA Jnl., v16 n10 p1097-1098 Oct 78 (No copies furnished by DTIC).

No abstract available.

AD-A075 075/2 Not available NTIS
California Univ Los Angeles
Overexpanded Two-Dimensional Transonic Free Jet,
R. D. Small. 13 Jul 78, 4p ARO-14309.5-E
Grant DAAG29-78-G-0008
Availability: Pub. in AIAA Jnl., v17 n3 p307-309 Mar 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 116/4 Not available NTIS
Michigan Univ Ann Arbor Dept of Mechanical Engineering
Cavitation Erosion: The State of the Art and Predicting Capability,
Frederick G. Hammitt. 1979, 11p
Contract N00014-76-C-0697
Availability: Pub. in Applied Mechanics Reviews, v32 n6 p665-675 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 152/9 PC **A02/MF A01**
Toronto Univ Downsview (Ontario) Inst for Aerospace Studies
Ionizing Argon Boundary Layers. Part 2. Shock-Tube Side-Wall Boundary-Layer Flows,
W. S. Liu , and I. I. Glass. 10 Aug 78, 21p AFOSR-TR-79-1048
Grant AFOSR-77-3303
Pub. in Jnl of Fluid Mechanics, v91 pt4 p679-696 1979. See also Part 1, AD-A066 056.

No abstract available.

AD-A075 292/3 Not available NTIS
Princeton Univ N J
Gasdynamic Modeling and Computational Accuracy,
Gregory Shubin , and Sin-I Cheng. 12 Oct 77, 17p
Contract N00014-75-C-0376
Availability: Pub. in Jnl. of Computational Physics, v32 n1 p39-55 Jul 79 (No copies furnished by DTIC).

No abstract available.

ESDU-79017 PC**$386.50**
Engineering Sciences Data Unit Ltd., London (England).
Prandtl Number of Water and Steam.
Data item.
c1979, 14p ISBN-0-85679-262-4
Supersedes ESDU-68011. Also pub. as ISSN-0141-4062, 0141-4070.
For information on availability of series, sub-series, and other individual data items, write: NTIS, Attn: ESDU, Springfield, VA. 22161.

The report provides evaluated tabulated data for the Prandtl number of water and steam that are derived from data in agreement with the current International Formulation. The results may be applied in heat transfer and fluid flow calculations in the design of chemical plant and steam turbines, boilers and other mechanical engineering equipment. The calculations supply values for water and steam along the saturation line from the triple point to the critical point, and for temperatures from 0 to 800 C and pressures from 1 to 1000 bar in the single-phase region.

N79-32152/7 PC **A02/MF A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
Large Eddy Simulation of Turbulent Channel Flow: Illiac 4 Calculation.
J. Kim, and P. Moin. Sep 79, 21p NASA-TM-78619, A-7952
Conf-Presented at AGARD Symp. On Turbulent Boundary Layer, Experiment, Theory, and Modelling, the Hague, Netherlands, 24-27 Sep. 1979.

The three-dimensional time dependent equations of motion were numerically integrated for fully-developed turbulent channel flow. A large scale flow field was obtained directly from the solution of these equations, and small scale field motions were simulated through an eddy viscosity model. The calculations were carried out on the ILLIAC 4 computer. The computed flow patterns show that the wall layer consists of coherent structures of low speed and high speed streaks alternating in the spanwise direction. These structures were absent in the regions away from the wall. Hot spots, small localized regions of very large turbulent shear stress, were frequently observed. The profiles of the pressure velocity-gradient correlations show a significant transfer of energy from the normal to the spanwise component of turbulent kinetic energy in the immediate neighborhood of the wall ('the splatting effect').

N79-32499/2 PC **A03/MF A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
Nonparallel Stability of Two-Dimensional Nonuniformly Heated Boundary-Layer Flows.
A. H. Nayfeh, and N. M. El-hady. 1979, 37p NASA-CR-162309, VPI-E-79.1

An analysis is presented for the linear stability of water boundary-layer flows over nonuniformly flat plates. Included in the analysis are disturbances due to velocity, pressure, temperatures, density, and transport properties as well as variations of the liquid properties with temperature. The method of multiple scales is used to account for the nonparallelism of the mean flow. In contrast with previous analyses, the nonsimilarity of the mean flow is taken into account. No analysis agrees, even qualitatively, with the experimental data when similar profiles are used. However, both the parallel and nonparallel results qualitatively agree with the experimental results of Strazisar and Reshotko when nonsimilar profiles are used.

N79-33431/4 PC **A03/MF A01**
Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
Mechanics of Boundary Layer Transition. Part 6: Spatial Instability in Laminar Flow.
W. O. Criminale. Jan 68, 34p VKI-LECTURE-Ser-3-PT-6
Conf-Lecture Held at Rhode-Saint-Genese, Belgium, 15-19 Jan. 1968.

The role of spatial instability in laminar flows is analyzed using linear stability theory. Calculations for the boundary layer, the effects of the inviscid jet and wake, the occurence of singularities, and the problem of inviscid free shear layer are considered.

N79-33433/0 PC **A03/MF A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

Developments in the Computation of Turbulent Boundary Layers.
M. W. Rubesin. Sep 79, 26p NASA-TM-78620, A-7953
Conf-Presented at AGARD Symp. On Turbulent Boundary Layer - Experiment, Theory and Modelling, the Hague, 24-27 Sep. 1979.

Computational techniques applicable to turbulent boundary layers are classified into solutions of Reynolds-averaged equations, in which all the effects of the turbulence are modelled, and solutions of three-dimensional, time dependent Navier-Stokes equations, in which the large eddies are calculated and only the turbulence at scales smaller than the computational mesh spacings has to be modelled. Current computation costs place engineering computations in the first of these categories; large eddy simulations are appropriate currently for special studies of the dynamical processes of turbulence in idealized flow fields. It is shown that the two methods are interrelated and that each can gain from advances in the other. The degree of success of a pair of increasingly complex Reynolds stress models to broaden their range of applicability is examined through comparisons with experimental data for a variety of flow conditions. An example of a large-eddy simulation is presented, compared with experimental results, and used to evaluate the models for pressure rate-of-strain correlations and dissipation in the Reynolds-averaged equations.

N79-33434/8 PC **A06**/MF **A01**
CHAM of North America, Inc., Huntsville, Ala.
Computer Code for Analysing Three-Dimensional Viscous Flows in Impeller Passages and Other Duct Geometries.
Final Report.
D. G. Tatchell. Sep 79, 104p NASA-CR-161319, CHAM-1712/2
Contract NAS8-33090

A code, CATHY3/M, was prepared and demonstrated by application to a sample case. The preparation is reviewed, a summary of the capabilities and main features of the code is given, and the sample case results are discussed. Recommendations for future use and development of the code are provided.

N79-33436/3 PC **A03**/MF **A01**
Aeronautical Research Associates of Princeton, Inc., N. J.
An Investigation of the Turbulence Scale Tensor in a Flat-Plate Boundary Layer.
Final Report.
R. D. Sullivan, C. D. Donaldson, and G. Sandri.
Jan 79, 46p NASA-CR-152318, ARAP-378
Contract NAS2-8014

A differential equation for the scale tensor in turbulent flow is developed from basic considerations and applied to the flow of a constant-density fluid in the boundary layer on a flat plate. Results from preliminary runs of a computer implementation are discussed.

20E. Masers and Lasers

AD-A075 063/8 PC **A04**/MF **A01**
Jaycor Alexandria Va
The Non-Linear Theory of Free Electron Lasers and Efficiency Enhancement.
Memorandum rept.,
P. Sprangle , Cha-Mei Tang , and W. M. Manheimer. 28 Sep 79, 53p NRL-MR-4034
DARPA Order-3817

The development of lasers in which the active medium is a relativistic stream of free electrons has recently evoked much interest. The potential advantages of such free electron lasers include, among other things, continuous frequency tunability, very high power of operations and high efficiency. The free electron laser is characterized by a pump field; for example, a spatially periodic magnetic field, which scatters from a relativistic electron beam. The scattered radiation has a wavelength much smaller than the pump wavelength depending on the electron beam energy. We present a general self-consistent non-linear theory of the free electron laser process. The non-linear formulation of the temporal steady state free electron laser problem results in a set of coupled differential equations governing the spatial evolution of the amplitudes and wavelength of the radiation and space charge fields. These equations are readily solved numerically since the amplitude and wavelength vary on a spatial scale which is comparable to a growth length of the output radiation. A number of numerical/analytical illustrations are presented ranging from the optical to the submillimeter wavelength regime. Our non-linear formulation in the linear regime is compared with linear theory and agreement is found to be excellent. Analytical expressions for the saturated efficiency and radiation amplitude are also shown to be in very good agreement with out non-linear numerical solutions. Efficiency curves are obtained for both the optical and submillimeter FEL examples with fixed magnetic pump parameters. We show that these intrinsic efficiencies can be greatly enhanced by appropriately contouring the magnetic pump period.

AD-A075 133/9 PC **A03**/MF **A01**
Naval Research Lab Washington Dc
Methods of Efficiency Enhancement and Scaling for the Gyrotron Oscillator.
Interim rept.,
K. R. Chu , M. E. Read , and A. K. Ganguly. 20 Sep 79, 29p Rept no. NRL-MR-4051
Contract DOE-DE-AC01-79ET52053

It is shown that a gyrotron oscillator operating in a slightly tapered magnetic filed can attain an efficiency of about 78%, approximately 1.7 times higher than that obtainable in a constant magnetic field. Extensive numerical data have been tabulated and a convenient parameter is introduced to generate numerical efficiency scaling relations through which optimum operating conditions are clearly exhibited. Conditions for reaching the high efficiency operating regime have also been studied and are numerically illustrated. (Author)

AD-A075 187/5 PC **A04**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Physical Problems of X-Ray Laser,
Shen Ko. 5 Jun 79, 52p Rept no. FTD-ID(RS)T-0635-79
Edited trans. of Chi Kvang (China) n1 and 2 p46-55, 56-63 1978, by H. P. Lee.

No abstract available.

AD-A075 197/4 PC **A14**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Laser Conquers the Sky,
V. Ye. Zuyev. 14 Dec 78, 318p Rept no. FTD-ID(RS)T-1723-78
Unedited machine trans. of mono. Lazer Pokoryayet Nebo, Novosibirsk, 1972 p1-190.

No abstract available.

AD-A075 210/5 PC **A06**/MF **A01**
Naval Postgraduate School Monterey Ca
Frequency Control of a CO2 Laser Using Stark Cell Stabilization.
Master's thesis,
Daniel Morris Brown. Jun 79, 121p

Preliminary studies have been carried out for the frequency and intensity stabilization of the output of a carbon Dioxide laser, by feedback control of resonator length. Fluctuations due to discharge current and temperature and flow rate of coolant were studied. Current regulation of the power supply was found to be necessary for intensity stability. Cavity length tuning allowed vibration-rotation line selection, with a strong hysteresis effect. A computer analysis of error signal production for a pyroelectric detector and for a HgCdTe detector indicated that phase sensitive detection of the first harmonic signal component gave the typical frequency discriminant. Operation of a servo loop integrator for the feedback loop has been considered. A suitable Stark Effect absorption cell for feedback signal generation has been constructed, but has not been applied to the laser. (Author)

AD-A075 234/5 MF **A01**
Rhode Island Univ Kingston Dept of Electrical Engineering
Optical Materials for 2 to 6 micrometers and 10.6 micrometers High Power Lasers.
Final rept. 6 Apr 75-30 Sep 76,
Shashanka S. Mitra. Feb 77, 284p URI-9804/4263, RADC-TR-77-362
Contract F19628-75-C-0163
Availability: Document partially illegible.

Several optical properties of materials suitable as components useable with CO2 with (10.6 micrometers) and other chemical lasers (2 to 6 micrometers) are considered. Frequency and temperature dependence of absorption coefficient in the transparent regime of alkaline earth fluorides and mixed fluorides have been measured and understood on the basis of current theories and their desirability as window materials in the 2 to 6 micrometers region has been assessed. Lattic dynamics of mixed crystals and structurally disordered solids have been considered in the context of their phonon optical properties. The optical properties and electronic structure of amorphous semiconductors have been investigated emphasizing the changes relative to the ordered state resulting from the structural disorder. Also considered here are the properties, e.g., elasto-optic coefficients, responsible for beam distortion at high photon flux in an optical component. (Author)

AD-A075 363/2 PC **A03**/MF **A01**
Naval Research Lab Washington Dc
The Theory of Free Electron Lasers.
Interim rept.,
P. Sprangle , and Robert A. Smith. 18 Sep 79, 29p Rept no. NRL-MR-4033
DARPA Order-3817

A general analysis is presented of free electron lasers in which a static periodic magnetic pump field is scatterd from a relativistic electron beam. The steady state formulation of the problem is fully relativistic and contains beam thermal effects. Growth rates associated with the radiation field, efficiencies, and saturated field amplitudes are derived for various modes of operation. Effects of space charge on the scattering process are included and shown to play a dominant role in certain situations. Scaling laws for the growth rates and efficiencies at a fixed radiation frequency as a function of the magnetic pump amplitude are obtained. The shear in beam axial velocity due to self fields is discussed and various methods of reducing it are suggested. Finally, a detailed illustration of a far infrared (lambda = 2mu m) two-stage free electron laser using a 3 MeV electron beam and a 2 cm wavelength magnetic pump field is presented. (Author)

AD-A075 476/2 PC **A14**/MF **A01**
Army Missile Command Redstone Arsenal Al Technology Lab
Chemical Laser Systems: An Engineering Approach. Volume I. Chemical Laser Analysis Program.
Technical rept.,
Clark D. Mikkelsen , and Billy J. Walker. 31 Jan 79, 320p Rept no. DRSMI-T-79-24-VOL-1

The Chemical Laser Analysis Program presented in this report is a computer program for the rapid, parametric evaluation of high energy, chemical laser systems including the combustion chemistry, laser devices gas dynamics, various diffuser-ejector pressure recovery subsystems, and system volume/mass estimates. The program does not calculate specific laser power but relies on experimental data for scaling information. The FORTRAN EXTENDED computer program listing, as well as detailed information on program development, organization, and operating procedure are given along with a complete program nomenclature and two sample cases. (Author)

N79-32538/7 PC **A06**/MF **A01**
Rockwell International Corp., Anaheim, Calif.
High Power Phase Locked Laser Oscillators.
Final Report.
C. L. Hayes, C. L. Telk, J. Soohoo, and W. C. Davis. May 79, 103p NASA-CR-159630, C76-1555/501
Contract NAS3-20376

The feasibility of mechanizing an adaptive array of independent laser oscillators for generation of a high power coherent output was experimentally investigated. Tests were structured to evaluate component/system requirements for delivery of energy to a low-earth orbit satellite. Initial experiments ad-

dressed the control issues of phase locking unstable resonators at low power levels. A successful phase lock demonstration formed the basis for the design and fabrication of the high power, water-cooled, control mirror subsequently installed in the NASA LeRC high power laser. Tests were performed to characterize the operational limits of the laser system and included quantitative assessment of the frequency stability, noise sources, and optical properties of the beam.

N79-32539/5 PC **A03**/MF **A01**
Miami Univ., Oxford, Ohio. Dept. of Physics.
Nuclear-Pumped Lasers 2.
Final Report, 1 Mar. 1977 - 31 Aug. 1979.
W. Wells, and R. Deyoung. 1979, 33p NASA-CR-162320
Grant NSG-1396

The two main research objectives of the contract were to demonstrate high power nuclear lasering (of the order of a kWatt), and demonstrate nuclear pumping with fission fragments from (U-235)F6. The progress made towards these objectives is discussed.

N79-32540/3 PC **A03**/MF **A01**
Laser Development Corp., Lexington, Mass.
Development of Tunable High Pressure CO2 Laser for Lidar Measurements of Pollutants and Wind Velocities, January 1976 to December 1977.
Final Report, Jan. 1976 - Dec. 1977.
A. Javan. Sep 79, 27p NASA-CR-3175
Contract NAS1-14289

A tunable multiatmospheric pulsed CO2 laser with emphasis on experimental features and supporting theoretical analyses important to differential absorption lidar and Doppler lidar measurement of pollutants and wind velocities is reported. The energy deposition and the means to produce the uniform high density plasma in the multiatmospheric medium, through UV preionization of an organic seed gas is discussed. Design features of the pulsed CO2 laser are presented. The radiative processes which are operative and prevent the laser from breaking into oscillations in a large number of modes over its broad amplification bandwidth are described. The mode competition for the transient pulsed laser oscillation in a standing wave and traveling wave ring laser configuration is discussed and contrasted with the approach to steady state oscillations. The latter findings are important to transient injection locking for production of a highly stable pulsed CO2 laser output.

20F. Optics

AD-A075 041/4 PC **A02**/MF **A01**
Visidyne Inc Burlington Mass
Background Suppression in Double-Beam Interferometry,
T. F. Zehnpfennig , O. Shepherd , S. Rappaport , W. P. Reidy , and G. Vanasse. 29 Dec 78, 8p
AFGL-TR-79-0202
Contracts F19628-76-C-0198, F19628-77-C-0218
Pub. in Applied Optics, v18 n12 p1996-2002, 15 Jun 79.

No abstract available.

AD-A075 067/9 Not available NTIS
Stanford Univ Ca Edward L Ginzton Lab
Optical Parametric Oscillator Threshold and Linewidth Studies,
Stephen J. Brosnan , and Robert L. Byer. 2 Jan 79, 17p GL-2913, ARO-15278.5-P
Grant DAAG29-77-G-0221
Availability: Pub. in IEEE Jnl. of Quantum Electronics, vQE-15 n6 p415-431 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 084/4 Not available NTIS
Stanford Univ Ca Edward L Ginzton Lab
Optical Parametric Amplification,
Richard A. Baumgartner , and Robert L. Byer. 14 Dec 78, 13p ARO-15278.4-P
Grant DAAG29-77-G-0221
Availability: Pub. in IEEE Jnl. of Quantum Electronics, vQE-15 n6 p432-444 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 109/9 PC **A03**/MF **A01**
Army Missile Command Redstone Arsenal Al Technology Lab
Automated Laser Speckle Interferometry Displacement Contour Analyzer.
Technical rept.,
John A. Schaeffel, Jr. 2 Jul 79, 43p Rept no. DRSMI-T-79-1

This work presents a new technique and experimental equipment to analyze Young's Fringe speckle interferograms. A new method using an off-axis optical photodetector was developed for generating displacement contour maps of bodies when deformed under load. Laser speckle interferograms are made of the deformed body and analyzed with a special displacement contouring computer analyzer. Interferograms of a flawed composite tube were analyzed by the system and are presented in the work. Currently operating at about 20% of its maximum rated speed, the system can analyze 5000 data points in less than four minutes. This report presents both the theory and hardware which may be utilized to generate displacement contour maps of deformed bodies. (Author)

AD-A075 564/5 Not available NTIS
Rome Air Development Center Hanscom AFB Ma Deputy for Electronic Technology
Modes of Weakly Guiding Fibers by an Integral Representation Technique,
Leonard Eyges. 1979, 9p Rept no. RADC/ETR-79-0020
Availability: Pub. in Fiber Optics: Advances in Research and Development, p303-311 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 565/2 Not available NTIS
Parke Mathematical Labs Inc Carlisle Mass
Solitons in the Theory of Guided Lightwaves,
Bernard Bendow , and Stanford P. Yukon. 1979, 29p RADC/ETR-79-0021
Contract F19628-78-C-0089
Availability: Pub. in Fiber Optics: Advances in Research and Development, p323-351 1979 (No copies furnished by DTIC).

No abstract available.

N79-32282/2 PC **A03**/MF **A01**
Flachglas A.G. DELOG-DETAG, Gelsenkirchen (Germany, F.R.). Zentralabt. Forschung-Entwicklung.
Development of an Industrial Process for the Production of Indium Oxide Layers for the Improvement of the K-Values of Insulating Glass Panes.
Final Report.
H. J. Glaeser. Dec 78, 50p BMFT-FB-T-78-34
Contract BMFT-03E-5001-A/ETS-0004-A
Conf-Presented at Seminar 'Sonnenenergie', Bonn, 20-21 Sep. 1977.
In German; English Summary.

The use of highly transparent coatings of indium oxide with low emissivity to improve the thermal insulation of double glazing units as the result of a reduced radiation exchange was investigated. A coating process was tried, in which a partly oxidized In (80%)/Sn(20%)-alloy is applied by means of cathode sputtering followed by thermal oxidation and a treatment with forming gas. With such coatings a light transmission of 77% and a K-value of 2.0 W/m sq XK were obtained in double glazing structures during experiments on a semi-industrial plant (glass panes up to 1 x 1 m). However, a comparison of costs showed that the sputtering process will be more expensive than the sputtering of a single, extremely thin gold-layer which shows comparable characteristics.

N79-33026/2 PC **A02**/MF **A01**
Research Inst. of National Defence, Stockholm (Sweden).
Calculation of Forward Scattered Intensity from Particles at Optical Beam Propagation.
K. Oestberg. Mar 79, 15p FOA-C-30164-E1

The propagation of an optical beam through a homogeneous medium with particles which scatter the light is considered. The ratio between the incoherent intensity in the forward direction and the coherent intensity is calculated for different models of the propagation medium. The models considered are isotropic scattering particles, particles which are so large that the far field in the near forward direction can be described by the Fraunhofer diffraction pattern, and finally some particle models of atmospheric haze. In general, the incoherent intensity is much smaller than the coherent intensity. It is furthermore shown that the relative amount of the incoherent intensity is a sensitive function of the particle sizes; big particles give much more incoherent intensity than small particles.

PB80-801368 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Acoustooptical Laser Modulators and Deflectors (Citations from the NTIS Data Base).
Rept. for 1969-Nov 79,
Brian Carrigan. Dec 79, 112p
Supersedes NTIS/PS-78/1186 and NTIS/PS-77/1071. For the companion Published Search of the Engineering Index Data Base, see PB80-801376.

Citations of Federally-funded research on acoustooptic equipment in laser beam modulation, filtering, scanning, deflection, switching, and tuning are covered. The uses of these acoustooptical devices in imaging, fiber optics, optical communications, optical radar, and measuring instruments are described. Research on carbon dioxide and dye lasers is included. (This updated bibliography contains 103 abstracts, 5 of which are new entries to the previous edition.)

PB80-801376 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Acoustooptical Laser Modulators and Deflectors (Citations from the Engineering Index Data Base).
Rept. for 1970-Nov 79,
Brian Carrigan. Dec 79, 117p
Supersedes NTIS/PS-78/1187, and NTIS/PS-77/1072. For the companion Published Search of the NTIS Data Base, see PB80-801368.

Abstracts of worldwide research on the theory and design of acoustooptical devices for laser beam modulation, deflection, splitting, mode locking, and tuning are presented. Studies on materials and their performance are covered. The applications of the acoustooptic interaction for the development of devices for optical information processing, optical modulators, switches, scanners, and color TV display systems are included. Simulation, testing, and performance of the equipment are also described. (This updated bibliography contains 112 abstracts, 17 of which are new entries to the previous edition.)

UCRL-82528 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Precision Machining Vs. Optical Process.
J. W. Pearson. 27 Mar 79, 8p CONF-790436-1
Contract W-7405-ENG-48
SIRA-NPL conference on advances in optical production technology, Teddington, Middlesex, UK, 24 Apr 1979.

High multiples of advantage in both time and cost make the emerging technology of advanced precision machining attractive as a fabrication process for a class of optical parts. The capability of the numerical control machine tool to cut complex geometries allows functional design improvements of optical elements over what is economically feasible by conventional optical process. Machining optical parts, however, is limited to materials amenable to the diamond tool bit, which excludes glass and ferrous metals, but includes ductile metals, plastics and a number of other materials suitable for optical elements. (ERA citation 04:039096)

20G. Particle Accelerators

N79-33006/4 PC **A03**/MF **A01**
Brown, Boveri und Cie, A.G., Mannheim (Germany, F.R.).

Tests on a 50TERA Neutron Generator Test des 50TERA Neutronengenerators.
H. Goergemanns. 1978, 39p BMVG-FBWT-78-14
Subm-Sponsored by Bundesmin. Der Verteidung.
Language in German.

After the construction, testing, and beam optimization (with protons) at a neutron generator, the device was dismantled and transferred to Munster where it was reassembled. The reassembled generator and its components were again tested. Its performance with proton beams and deuterium was examined; an appropriate duoplasmatron source was developed. The objective was to generate an ion beam with the smallest possible diameter in order to be able to use smaller targets. A cooled reduction flange was developed to accomodate the small target in a large accelerator aperture. Results obtained with this modified generator and the beam characteristics measured are discussed.

N79-33008/0 PC **A02**/MF **A01**
Instituut voor Kernphysisch Onderzoek, Amsterdam (Netherlands).
The 500 Mev, 10% D.F. Linear Accelerator (MEA) under Construction at Amsterdam.
Status Report.
P. J. T. Bruinsma, and C. Devries. Mar 79, 22p REPT-79/1
Conf-Presented at Conf. On Future Possibilities for Electron Accelerators, Charlottesville, VA., Jan. 1979.

The design parameters and the general lay-out of buildings and of the main components of the accelerator are presented. Some of the accelerator features which are typical for the Amsterdam machine are described. The performance obtained so far with the first part of the machine, with some remarks on the planning for the next 2 years is detailed. The experimental facilities under construction, the status, and the planning schedule are indicated, including the 140 MeV station, the 500 MeV beam handling system, the secondary beam area, and the 500 MeV electron scattering facility.

N79-33009/8 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Electron Physics.
Microtron Injector for LEP.
M. Eriksson, D. Reistad, and S. Rosander. Mar 79, 11p TRITA-EPP-79-05

In the 15 to 100 GeV position electron Colliding Beam Machine (LEP) under study by the European Committee for Future Accelerators it is intended to use a 460 MeV accumulation ring (ACR) to collect a previously bunched beam of electrons or positrons before it is injected into a booster synchrotron. It is proposed to compress the longitudinal bunch length in the ACR by means of two r.f. systems that act on the beam one after the other like in the Positron Intensity Accumulator. Long beam pulses of 2 to 3 microsec can then be injected into ACR with multiturn injection. Compared to previous proposals the injected beam current can be reduced, and great savings in terms of peak microwave power can be achieved. Further economy and reliability in the LEP front-end machine can be gained by the use of an electron-positron racetrack microtron. The general concepts of such a microtron are indicated.

20I. Plasma Physics

AD-A075 148/7 PC **A02**/MF **A01**
Michigan Univ Ann Arbor Laser Plasma Interaction Lab
Interferometric Characterization of Density Dynamics of an Ultradense Z-Pinch Plasma,
John G. Ackenhusen , and David R. Bach. 23 Mar 78, 4p AFOSR-TR-79-1050
Grant AFOSR-77-3349
Pub. in Jnl. of Applied Physics, v50 n4 p2956-2958 Apr 79.

No abstract available.

AD-A075 153/7 PC **A02**/MF **A01**
Michigan Univ Ann Arbor Dept of Physics
Holographic Interferometry of a High-Energy-Density Exploding Lithium Wire Plasma,
Paul D. Rockett , and David R. Bach. 5 Sep 78, 7p AFOSR-TR-79-1051
Grant AFOSR-79-0030
Pub. in Jnl. of Applied Physics, v50 n4 p2670-2674 Apr 79.

No abstract available.

AD-A075 155/2 PC **A02**/MF **A01**
Michigan Univ Ann Arbor Laser Plasma Interaction Lab
Laser-Driven Hydrodynamic Perturbation in an Overdense Z-Pinch Plasma,
John G. Ackenhusen , and David R. Bach. 23 Mar 78, 8p AFOSR-TR-79-1052
Grant AFOSR-77-3349
Pub. in Jnl. of Applied Physics, v50 n4 p2623-2629 Apr 79.

No abstract available.

AD-A075 350/9 PC **A04**/MF **A01**
Naval Research Lab Washington Dc
A Theory of Anomalous Absorption, Backscatter and Flux Limitation in Laser-Produced Plasmas.
Interim rept.,
D. G. Colombant , and W. M. Manheimer. 11 Oct 79, 68p Rept no. NRL-MR-4083

Fluid simulations of laser light absorption and backscatter are presented for various laser irradiances, wavelengths, target materials, laser pulse lengths and simulated prepulse conditions. Physical processes included in the model are inverse bremsstrahlung, resonant absorption, absorption by ion-acoustic fluctuations, and Brillouin backscatter. For the anomalous processes, self-consistent transport coefficients are derived and used throughout the time-dependent, one-diminsional code. Flux limitation is thus taken into account as a result of the physical processes included. Interplay between the various absorption mechanisms and backscatter are uncovered in this study. Comparisons with experiments are presented and suggestions for further experiments are made. (Author)

N79-33028/8 PC **A03**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Numerical Calculations on the Propagation of Microwaves in Highly over-Dense Magnetized Plasma.
K. Minami. Jul 79, 27p IPPJ-404

Propagation of microwaves in highly over-dense magnetized plasmas is numerically calculated. Well known cold plasma approximation and geometrical optics are used. It is shown that microwave can be propagated even in high-density magnetized plasmas, if an antenna launching the field with n parallel to the 2d power greater than 1 or n parallel to the 2d power less than 0 is adopted. Here, n parallel is the refractive index parallel to the static magnetic field which is perpendicular to the density gradient. However, the application of this principle to plasma diagnosis is limited, since in the case n parallel to the 2d power greater than 1 one has to insert the antenna into the density where omega sub p/omega approximately equals 1, whereas in the case n parallel to the 2d power less than 0, propagation can be expected only near the surface of the antenna.

N79-33029/6 PC **A03**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Cross-Field Electron Heat Transport Due to High Frequency Electrostatic Waves.
H. Naitou. 7 Jul 79, 31p IPPJ-405

Cross-field electron heat diffusion due to thermally excited high frequency electrostatic waves propagating almost perpendicular to the magnetic field was studied using a two-and-one-half-dimensional simulation code. It is shown that the electron heat diffusion coefficient, D sub H, is an order of magnitude greater than the electron self-diffusion coefficient D sub p, which is essentially collisional. The characteristic feature of wave transport is observed, namely an increase of D sub H with increasing values of the characteristic temperature scale length. The heat diffusion coefficient D parallel sub H and D perpendicular sub H for the parallel and perpendicular temperatures show quite different magnetic field scalings since D parallel sub H is due to ion modes while D perpendicular sub H arises from electron modes.

N79-33030/4 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Competition of Weakly Collisional and Neighboring Wave Effects for the Destruction of Amplitude Oscillations.
O. Fukumasa, H. Abe, and R. Itatani. Jul 79, 17p IPPJ-407

The destruction mechanism of the amplitude oscillation in the system of a cold beam and a weakly collisional plasma are examined. The amplitude oscillation can be destroyed either by the weak collision effects or by the effects of the neighboring waves of the most unstable mode. Either of them competes with another in playing a decisive role for the destruction. If an expansion parameter is constant, the system becomes stable for the growth of the neighboring waves, as the beam velocity increases.

N79-33031/2 PC **A03**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
An Ion Source Plasma Starting from a Cold LaB6 Cathode 1.
J. Uramoto. Jul 79, 27p IPPJ-406

A hydrogen plasma source is produced from a cold hollow LaB6 cathode which is heated stably within 3 sec by a concentrated predischarge below 200 V. It should be noted that misdischarges diffusing to chamber walls and damages of the cathode due to ion bombardments are avoided. Moreover, the plasma source is stable as external electric fields are removed from there.

N79-33032/0 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Compression of Toroidal Plasma by Imploding Plasma-Liner.
K. Ikuta. Jul 79, 14p IPPJ-408

A concept of compressing a plasma in a closed magnetic configuration by a version of liner implosion flux compression technique is considered. The liner consists of a dense plasma cylinder, i.e. the plasma-liner. Maximum compression ratio of toroidal plasma is determined just by the initial density ratio of the toroidal plasma to the liner plasma because of the Rayleigh-Taylor instability. A start-up scenario of plasma-liner is also proposed with a possible application of this concept to the creation of a burning plasma in reversed field configurations, i.e. burning plasma vortex.

N79-33033/8 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Initial Frequency Shift of Large Amplitude Plasma Wave. 2: Ion Acoustic Wave.
K. Yamanaka, R. Sugihara, Y. Ohsawa, and T. Kamimura. Jul 79, 22p IPPJ-409

A nonlinear complex frequency shift of the ion acoustic wave in the initial phase defined by 0 t t sub c is obtained, which is valid for arbitrary phi sub 0 and omega sub S/k as long as omega sub S much greater than gamma sub L, where phi sub 0, omega sub S, gamma sub L and t sub c are the initial value of the potential value of the potential, the frequency of the wave, the linear Landau damping coefficient and the time for the first minimum of the amplitude oscillation, respectively. A simulation study is also carried out. The results confirm the validity of the theory.

N79-33035/3 PC **A03**/MF **A01**
Stanford Univ., Calif. Inst. for Plasma Research.
Variational Description of the Positive Column with Two-Stem Ionization.
F. W. Crawford. Sep 79, 32p NASA-CR-162314, SU-IPR-795
Contract NGL-05-020-176

The ionization balance in diffusion dominated discharges which depends on both one and two step ionization processes is considered. The Spenke diffusion equation (D sq delta n + nu n + sq kn =0) describing such conditions is solved by the Rayleigh-Ritz variational method. Simple analytic approximations to the density profile, and the similarity relation between nu,k,D and the discharge dimensions, are derived for planar and cylindrical geometry, and compared with exact computations for certain limiting cases.

N79-33059/3 PC **A03**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Plasmaforschung.

Research Report, 1977 Forschungsbericht 1977.
Annual Report.
H. Zwicker. 1977, 50p
Language in German.

Waves and plasma heating, the High Tension Belt-Pinch Plasma (HTBP), laser applications, and plasma focussing were studied. Highlighted topics include the operation of the HTBP (the mehanical construction of which was recently completed), the successful starting up of the Theta Pinch Experiment and preliminary measurements of state variables, pulsed scattering diagnostics with heterodyne reception in the field of laser applications, and the completion of authorization procedures for the new 500 kJ Plasma Focus Building.

N79-33061/9 PC **A04**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Plasmaforschung.
Analyticscbe Behandlung des Runaway-Effekts (Analytical Treatment of Runaway Effects).
H. Zwicker. 1977, 75p IPF-77-4
Language in German.

The importance of runaway effects in plasma devices was studied. A Lorentz gas model is used to describe the effect in a constant electric field. Electrons experience only Coulomb collisions with infinitely heavy ions. The probability density is assumed to be constant in local space. The velocity space is divided into two regions. These are a low velocity region, where the density function is determined from collisions and found to be isotropic, and a high velocity region in which a quasi free acceleration of the particles is generated by the electric fields. The corresponding kinetic equations are normalized. Analytical solutions are given for both regions together with a coupling function which assures a constant number of particles. Particle densities, current densities, and energy densities associated with the effect are explained.

N79-33063/5 PC **A03**/MF **A01**
Research Inst. of National Defence, Stockholm (Sweden).
Magnetized Whirls in Plasma Discharges.
E. A. Witalis. May 79, 30p FOA-C-20303-D9
Subm-Sponsored by Chalmers Univ. Of Technol., Goteborg. Conf-Presented at 2nd Intern. Conf. On Energy Storage, Compression and Switching, Venice, 5-8 Dec. 1978.

Plasma focus is briefly described with emphasis on its capabilities as a neutron source. The filamentary whirl structures observed in the discharge plasma are described. Starting with a simple, early, and particularly well established case of vorticity imparted by a rotational electric field to the plasma in magnetohydrodynamic generators, a general derivation is then outlined proving that such magnetically induced rotation is a general feature for the normally Hall-conducting magnetized plasma. Physical interpretation of the effect are given and objection to it are critically reviewed as is also a theory proposing radiation cooling as the cause of plasma filamentation. In conjunction with a generalized Bennett relation theoretical whirl properties are predicted and found to agree with observations. Mechanisms that relate the whirls to nuclear fusion reaction conditions are tentatively indicated.

N79-33065/0 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.
Fast Magnetosonic Wave Spectrum in a Transversely Magnetized Plasma Cavity.
M. Bures. Apr 79, 36p TRITA-PFU-79-06
Subm-Sponsored by European Communities Comm.

The fast magnetosonic wave spectrum is calculated for a transversely magnetized plasma cavity, including the symmetric as well as the nonsymmetric mode spectrum. The calculations serve as a theoretical model for the internal ring apparatus with a poloidal static magnetic field. The influence of a nonuniform density and of vacuum layers at the plasma boundary on the wave spectrum is discussed. It is shown that in the case of high plasma density a great number of magnetosonic modes lie below omega sub ci. The influence of the density profile is to shift the frequencies of the modes towards the higher values and to introduce the Alfven resonant layers inside the plasma. The consideration of the finite axial wave numbers increases the number of modes very rapidly. Finally it is shown that the important frequency shift of the mode frequencies is caused by the influence of the boundary vacuum layers.

N79-33963/6 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Motion of Charged Particles in Constant and Uniform Electromagnetic Fields.
J. A. Bittencourt. Jul 79, 49p INPE-1506-RPE/046
Misc-Revised.

The motion of individual charged particles in the presence of electric and magnetic fields, which are constant in time and uniform in space are analyzed. The fields are assumed to be prescribed and, therefore, are not affected by the presence of the charged particles. The problem is analyzed in steps, using the nonrelativistic equations of motion, incorporating separately in the theory the effects associated with only the electric field, or only the magnetic field, and the effects which are due to both electric and magnetic fields.

N79-34032/9 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Some Basic Plasma Phenomena.
J. A. Bittencourt. Jul 79, 46p INPE-1502-RPE/042
Misc-Revised.

Electron plasma oscillations and the Debye shielding problem are analyzed using the macroscopic transport equations for each particle species in the plasma. The illustrate the use of the phase space distribution functions, the problem of the Debye potential is also analyzed in terms of the Vlasov equation. The physical mechanism of formation of the plasma sheath, near a boundary will in the plasma, and an approximate quantitative description of the inner structure of the sheath, are also presented as an application of the properties of the plasma sheath, the Langmuir plasma probe, which is widely used to measure plasma properties, is analyzed.

N79-34033/7 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Simple Applications of Magnetohydrodynamics.
J. A. Bittencourt. Jul 79, 46p INPE-1516-RPE/052
Misc-Revised.

A derivation of Parker's modified momentum equation is presented as well as the Chew, Goldberger and Low double adiabatic energy equations. Some special cases of the double adiabatic equations are analyzed. The concepts of magnetic viscosity and magnetic Reynolds number are introduced, and the phenomena of diffusion of the magnetic field lines through a plasma, and of freezing of the magnetic field lines to the plasma are considered. Magnetic pressure is examined and plasma confinement in a magnetic field is investigated.

N79-34034/5 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Macroscopic Equations for a Conducting Fluid.
J. A. Bittencourt. Jul 79, 33p INPE-1515-RPE/051
Misc-Revised.

A derivation of the macroscopic transport equations for a plasma, considered as a single conducting fluid is presented. The equations of conservation of mass, of momentum, and of energy, for the plasma as a whole, are derived starting from the corresponding equations for each individual species constituing the plasma. These equations are complemented by a set of electrodynamic equations for a conducting fluid. A detailed derivation is given for the generalized Ohm's law. The complete set of simplified magnetodynamic (MHD) equations, normally used in MHD problems, is also presented and the approximations involved are discussed.

N79-34035/2 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Motion of Charged Particles in Time-Varying Electromagnetic Fields.
J. A. Bittencourt. Jul 79, 41p INPE-1504-RPE/044

The motion of charged particles in the presence of an electric field varying slowly in time, and with an arbitrary time variation is analyzed as well as charged particles in the presence of a time-varying magnetic field and a space-varying electric field. The phenomenon of cyclotron resonance, and the process of magnetic heating of a plasma are also discussed.

N79-34036/0 PC **A04**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Waves in Hot Isotropic Plasmas.
J. A. Bittencourt. Sep 79, 54p INPE-1563-RPE/068
Misc-Revised.

The problem of wave propagation in a hot isotropic plasma, in the absence of an externally applied magnetic field, from the point of view of kinetic theory, using the Vlasov equation. The characteristics of the longitudinal plasmas mode and the transverse electromagnetic mode are examined. The problem of wave-particle interaction is also analysed, and the phenomenon of collisionless Landau damping and for the two-stream instability is described.

N79-34037/8 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Magnetohydrodynamic Waves.
J. A. Bittencourt. Jul 79, 37p INPE-1523-RPE/058

The propagation of very low frequency waves in a highly conducting fluid was analyzed. The characteristics of these MHD waves are investigated for propagation parallel, perpendicular, and in an arbitrary direction, with respect to an externally applied magnetic field. The effects of the displacement currents, and of viscosity, on wave propagation are also considered.

N79-34038/6 PC **A04**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
The Pinch Effect.
J. A. Bittencourt. Jul 79, 41p INPE-1520-RPE/056
Misc-Revised.

A detailed treatment of the pinch effect is presented for the special case in which the confinement is produced by an axiumthal self-magnetic field, due to an axial current in the pinched plasma column. A detailed analysis is given for the equilibrium pinch, the Bennett pinch, and the dynamic pinch. The geometrical instabilities which are commonly present in a pinched plasma column, known as the sausage instability and the kink instability, are discussed. The addition of stabilizing fields to the inched plasma column, and some convex field configurations, which provide a stable magnetic field confinement, are also described.

N79-34039/4 PC **A05**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Waves in Cold Plasmas.
J. A. Bittencourt. Aug 79, 79p INPE-1546-RPE/066
Misc-Revised.

The problem of wave propagation in a cold electron plasma is analyzed. Initially, the basic equations of magnetoionic theory, and their solution in terms of plane waves, are presented. The characteristics of high frequency wave propagation in isotropic electron plasmas, in the absence of an externally applied magnetic field, are analyzed. The problem of wave propagation in a cold, anisotropic plasma, immersed in a magnetic field is considered. The general dispersion relation and the Appleton-Hartree equation are derived, and the various modes of wave propagation in directions parallel and perpendicular to the magnetic field are

investigated. The properties of the CMA diagram are also described. An analysis of atmospheric whistler propagation, helicons, and the phenomenon of Faraday rotation in plasmas is presented.

N79-34040/2 PC **A04**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Waves in Warm Plasmas.
J. A. Bittencourt. Aug 79, 55p INPE-1547-RPE/067

The problem of wave propagation in a warm electron gas and in a warm, fully ionized plasma is analyzed considering cases when there is no magnetic field present and cases when the plasma is immersed in an externally applied magnetic field. The various possible modes of wave propagation are described and special emphasis is given to those aspects which are related with the pressure gradient terms in the equations of motion for each particle species. The various modes of wave propagation in a fully ionized, warm plasma are summarized.

N79-34041/0 PC **A04**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Plasma Conductivity and Diffusion.
J. A. Bittencourt. Jul 79, 58p INPE-1503-RPE/043
Misc-Revised.

The phenomena of electrical conductivity and diffusion in plasmas is analyzed. Expressions are derived for the DC and AC conductivity of anisotropic plasma, as well as of an anisotropic magnetoplasma, using the macroscopic equations pertinent to the cold plasma model. The problems of free diffusion and ambipolar diffusion in plasmas, are analyzed in terms of the warm plasma model. Diffusion in a fully ionized plasma is also discussed, using the magnetohydrodynamic equations.

UCID-18227 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Surface Motion and Confinement Potential for a Microwave Confined Corona.
D. L. Ensley. Jul 79, 18p
Contract W-7405-ENG-48

Approximate time dependent solutions for surface velocities and potentials are given for a plane polarized microwave field confining a hot, over-dense plasma corona. Steady state solutions to Poissons' equation can be applied to the time dependent case, provided transit time effects are included. The product of ion pressure and potential wave (surface) velocity gives an average heating rate approx. 7/32 NKT sub 0 V/sub theta/ directly to the ions. (ERA citation 04:052343)

UCID-18228 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Equilibrium Plasma Corona Surfaces.
D. L. Ensley. Jul 79, 12p
Contract W-7405-ENG-48

The distribution of charge of one sign when the opposite charge density is given is determined. Poisson's equation is solved in plane geometry for a simple specified ion density. This automatically gives the inverse solution for a given electron density, by reversing the sign of the potential. Some solutions can approximate a microwave confined corona, for very over dense cases. (ERA citation 04:052344)

20J. Quantum Theory

JEN-440 PC **A06**/MF **A01**
Junta de Energia Nuclear, Madrid (Spain).
Mathematical Problems in Non-Linear Physics: Some Results.
1979, 110p
In Spanish.
U.S. Sales Only.

The basic results presented in this report are the following: 1) Characterization of the range and kernel of the variational derivative. 2) Determination of general conservation laws in linear evolution equations, as well as bounds for the number of polynomial conserved densities in non-linear evolution equations in two independent variables of even order. 3) Construction of the most general evolution equation which has a given family of conserved densities. 4) Regularity conditions for the validity of the Lie invariance method. 5) A simple class of perturbations in non-linear wave equations. 6) Soliton solutions in generalized KdV equations. (Atomindex citation 10:450273)

N79-33673/1 PC **A02**/MF **A01**
California Inst. of Tech., Pasadena. Kellog Radiation Lab.
Gravitational Waves from Rotating and Precessing Rigid Bodies. 2: General Solutions and Computationally Useful Formulae.
M. Zimmerman. Sep 79, 14p NASA-CR-162344, OAP-577
Contract NGR-05-002-256

The classical mechanics results for free precession which are needed in order to calculate the weak field, slow-motion, quadrupole-moment gravitational waves are reviewed. Within that formalism, algorithms are given for computing the exact gravitational power radiated and waveforms produced by arbitrary rigid-body freely-precessing sources. The dominant terms are presented in series expansions of the waveforms for the case of an almost spherical object precessing with a small wobble angle. These series expansions, which retain the precise frequency dependence of the waves, may be useful for gravitational astronomers when freely-precessing sources begin to be observed.

20K. Solid Mechanics

AD-A075 193/3 PC **A20**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Geometric Shell Stability Theory,
A. V. Pogorelov. 23 Feb 79, 465p Rept no. FTD-ID(RS)T-2219-78
Unedited machine trans. of mono. Geometricheskaya Teoriya Ustoychivosti Obolochek, Moscow, 1966 p1-296.

No abstract available.

AD-A075 527/2 PC **A02**/MF **A01**
Army Materials and Mechanics Research Center Watertown Ma
On the Load-Displacement Relation for a Cracked Rectangular Specimen with Constrained Ends.
Final rept.,
Oscar L. Bowie , and Francis I. Baratta. Jul 79, 16p Rept no. AMMRC-TR-79-46

Relations are presented between the net force, the end displacement, and the stress intensity factor for cracked rectangular panels subjected to uniform displacement. Two configurations are considered: an edge-cracked panel and a center-cracked panel. If the stress intensity factor is already known in terms of the normal displacement, then the resulting formulation allows the determination of that stress intensity in terms of the applied load and vice versa. (Author)

AD-A075 558/7 PC **A02**/MF **A01**
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
The Effect of Wall Thickness Variation of K sub I for the Proposed C-Shaped Specimen,
J. A. Kapp , G. A. Pflegl , and J. H. Underwood. Aug 79, 11p ARLCB-MR-79020, AD-E440 043
Pub. in International Jnl. of Fracture, v13 p721-724 1977.

Finite element stress intensity factor solutions have been developed for the C-shaped specimen to study the effect of wall thickness variation on K sub I. Wall thickness variation arises when the inside and outside radii of the specimen are not concentric resulting in a specimen which is not symmetric with respect to the plane of the crack. This nonsymmetry causes shear stresses to develop on the plane of the crack which results in Mode II sliding in addition to the mode I opening of the crack surfaces.

N79-32151/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
Effect of Element Density on the NASTRAN Calculated Mechanical and Thermal Stresses of a Spar.
J. M. Jenkins. Oct 79, 14p NASA-TM-72868, H-1104

A NASTRAN model of a spar was examined to determine the sensitivity of calculated axial thermal stresses and bending stresses to changes in element density of the model. The thermal stresses calculated with three different element densities resulted in drastically differing values. The position of the constraint also significantly affected the value of the calculated thermal stresses. Mechanical stresses calculated from an applied loading were insensitive to element density.

N79-32576/7 PC **A19**/MF **A01**
Indian Inst. of Tech., Bombay. Dept. of Civil Engineering.
Numerical Analysis of Pressure Vessels Using Various Shell Theories.
T. Kant, and S. Patil. Mar 79, 444p IIT-B/CE-79-1

No abstract available.

N79-32594/0 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
A Finite Element Model to Study the Buckling Behavior of General Orthotropic, Midplane Symmetric, Elastic Plates.
J. F. M. Wiggenraad. Jan 79, 28p NLR-TR-77062-U
Contract NIVR-1808

A finite element model was developed which incorporates the bending-torsional coupling effect as it occurs in general orthotropic, midplane symmetric, elastic plates in order to analyze its influence on the buckling behavior of such plates. Some of the results were compared with known exact and approximate solutions. Indications are that values for the case of pure compression are more accurate than for the case of pure shear. Values derived for simply supported plates are also more accurate than those for clamped plates. It is concluded that a 4 x 4 grid size gives good results for the analysis of the stability of isotropic and special orthotropic plates. However, for general orthotropic plates an increase in grid size is necessary.

N79-32598/1 PC **A02**/MF **A01**
Oxford Univ. (England). Dept. of Engineering Science.
Effect of Deep Wedge-Shaped Notches of Small Flank Angle on Plastic Failure.
M. Shiratori, and B. Dodd. 1979, 15p OUEL-1282/79

Green's slip-line field for the plane-strain plastic bending of a plate with a wedge-shaped notch of small angle is generalized to take into account axial force. Two constraint factors are derived, T1 due to the axial force and M1 due to the bending moment, where the moment is taken about the mid-point of the ligament length. These constraint factors are mapped in constraint factor space providing general yielding loci. It is shown that the slip-time field solution becomes inadmissible for certain combinations of axial force and bending moments and Rice's upper bound solution is used under these circumstances.

N79-32599/9 PC **A02**/MF **A01**
Bari Univ. (Italy). Ist. di Costruzioni di Macchine.
The Dynamic Analysis of Structures: A Comparison Between Two Different Versions of Strudl 2.
B. Atzori, and F. Fresa. 1978, 24p

The various possibilities for performing a dynamic structural analysis, available in two different versions of STRUDL 2, were evaluated in relation to very simple structures for which the analytical solutions are known. The study was performed using mainly beam elements. The values of the C.P.U. time required to perform the various analyses are also given as a function of the number of degrees of freedom of the analysed structure. Results stress the applications of the programs for both

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3. Place dental floss against binding and wrap ends of dental floss around fingers
4. Close book; have someone hold trimmed edge
5. Pull dental floss, first from one side, then from the other until separation is achieved.

solving real-life problems and as a pedagogical aid to engineering students.

N79-33495/9 PC A02/MF A01
Technische Univ., Berlin (West Germany).
The Inclusion of Criteria and Procedures of Structural Fatigue Strength Assessment in the Design Process.
W. Beitz, and R. Haibach. 12 Oct 78, 20p ICAF-1092
Rean-Repr. From Berueckslchtigen der Betriebs-festigkeit im Rahmen des Methodischen Kon-struierens. Berichtsband 4. Sitzung des Arbeitsk-reises Betriebsfestigkeit (Darmstadt), 12 Oct. 1978 p 19-36.
In German; English Summary.

The various procedures suitable for assessing the fatigue strength of structural components have been discussed with reference to the particular stages of the design process. The criteria to be observed in treating the resulting problems may be derived by means of a given guide line, aimed at directing particular attention to the specified requirements of function, safety, fabrication, control, maintenance, etc. As the available input information for making an assessment of the structural behavior will depend on the stage achieved in realizing the design, there is the necessity of making an appropriate selection particular procedure to be applied by taking into account the associated expenditures as well.

20L Solid-State Physics

AD-A075 036/4 PC A02/MF A01
Rome Air Development Center Hanscom AFB Ma Deputy for Electronic Technology
Improved Electrical Mobilities from Implanting InP at Elevated Temperatures,
T. G. Ryan . 29 Mar 79, 4p Rept no. RADC/ETR-79-0017
Pub. in Applied Physics Letters, v35 n2 p192-194, 15 Jul 79.

No abstract available.

AD-A075 078/6 Not available NTIS
Case Western Reserve Univ Cleveland Ohio Dept of Physics
The Dielectric Properties of As-Received and Gamma Irradiated Fused Silica,
John Fontanella , Richard L. Johnston , George H. Sigel, Jr. , and Carl Andeen. 3 Nov 78, 14p ARO-13440.3-P
Grant DAAG29-76-G-0222
Availability: Pub. in Jnl. of Non-Crystalline Solids, v31 p401-414 1979 (No copies furnished by DTIC).

No abstract available.

AD-A075 087/7 Not available NTIS
North Carolina Univ At Chapel Hill Dept of Physics
Cluster Approach to Simulating Hopping in Random Media,
M. J. Schaffman , and M. Silver. 14 Sep 78, 5p ARO-14424.1-P
Grant DAAG29-77-G-0081
Availability: Pub. in Physical Review B, v19 n8 p4116-4120 15 Apr 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 090/1 Not available NTIS
Oklahoma State Univ Stillwater Dept of Physics
Laser Time-Resolved Studies of Exciton Migration in Doped Lithium Niobate,
Richard C. Powell , and Edwin E. Freed. 2 Jan 79, 5p ARO-13318.11-P
Grant DAAG29-76-G-0099
Availability: Pub. in Jnl. of Chemical Physics, v70 n10 p4681-4685, 15 May 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 115/6 PC A02/MF A01
Colorado State Univ Fort Collins Dept of Electrical Engineering
Self-Scattering Path-Variable Formulation of High-Field, Time-Dependent, Quantum-Kinetic Equations for Semiconductor Transport in the Finite-Collision-Duration Regime.
Technical rept.,
J. R. Barker , and D. K. Ferry. 19 Dec 78, 4p Rept no. CSU-TR-N-79-6
Contract N00014-78-C-0124
Pub. in Physical Review Letters, v42 n26 p1779-1781, 25 Jun 79.

No abstract available.

AD-A075 149/5 PC A02/MF A01
California Univ Irvine Dept of Physics
Attenuation of Rayleigh Waves by Foint Defects,
R. F. Wallis , D. L. Mills , and A. A. Maradudin. 6 Sep 78, 16p AFOSR-TR-79-1049
Grant AFOSR-76-2887
Pub. in Physical Review B, v19 n8 p3981-3995, 15 Apr 79.

No abstract available.

AD-A075 194/1 PC A09/MF A01
Foreign Technology Div Wright-Patterson AFB Oh
Surface Waves. Propagation, Excitation, Application,
E. Danicki. 9 May 79, 199p Rept no. FTD-ID(RS)T-2174-78
Edited trans. of Dodatek do Biuletynu Wojskowej Akademii Technicznej, Fale Powierzchniowe., Propagacja, Wzbudzanie Zastosowanie (Poland) v11 n291 p1-219 1976.

No abstract available.

AD-A075 216/2 PC A03/MF A01
Aerospace Corp Los Angeles Ca Electronics Research Lab
Josephson Junction Characterization from Impedance Measurements.
Interim rept.,
Helmut Kanter. 14 Sep 79, 20p TR-0079(4727)-1, SAMSO-TR-79-54
Contract F04701-78-C-0079
Supersedes Rept. no. ATM-78(3727)-1.

Voltage biased junctions in SQUID type configurations show a characteristic response in their MW impedance, which as indicated by a small signal analysis appears primarily determined by the junction termination at the low frequency idler. The evaluation of the response affords the measurement of some circuit and junction parameters which cannot otherwise be obtained from I-V measurements and thus could be considerable help in characterizing Josephson junctions in microwave circuits. (Author)

AD-A075 296/4 Not available NTIS
Princeton Univ N J Materials Lab
Time-Domain Photoacoustic Spectroscopy of Solids,
A. Mandelis , and B. S. H. Royce. 13 Oct 78, 9p ARO-13778.2-C
Contract DAAG29-76-C-0054
Availablity: Pub. in Jnl. of Applied Physics, v50 n6 p4330-4338 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A075 451/5 PC A02/MF A01
Brown Univ Providence Ri Dept of Chemistry
Preparation and Photoelectronic Properties of n-Type Cd2GeO4.
Technical rept.,
V. S. Nguyen , S. N. Subbarao , R. Kershaw , K. Dwight , and Aaron Wold. 1 Nov 79, 13p Rept no. TR-9
Contract N00014-77-C-0387

Cd2Geo4 crystallizes with an orthorhombic structure space group Pbnm (a=5.20,b-11.14,c-6.57A) as determined by the onset of photocurrent, the flat band potential is -0.80(5)V vs SCE. An indirect band gap at 3.15(5) eV and a direct band gap at 4.15(5) eV were ascertained from measurement of the photoelectronic quantum efficiency. Despite some initial loss in the photo-response during the first hour of irradiation at 1.0 W/cm2, Cd2Geo4 has been shown to be far more stable as an electrode than Cd2SnO4. (Author)

AD-A075 478/8 PC A04/MF A01
Rockwell International Anaheim Ca Electronics Research Center
GaAs Surface Effects.
Interim rept. 1 Jul-31 Dec 78,
Gordon J. Kuhlmann. Jun 79, 64p C78-851/501, AFAL-TR-79-1058
Contract F33615-78-C-1591

This report presents the results of the first six months of a program to investigate the passivation of GaAs surfaces using a native insulator. Ion implantation of phosphorus and subsequent oxidation of the surface was used to form the insulator. Post-implant annealing indicates that Chemical Vapor Deposition SiO2 has somewhat better encapsulating properties than sputtered Si3N4. It was found that high-dose phosphorus implantation significantly reduces decomposition of the semiconductor surface under the SiO2 encapsulant during high-temperature annealing. (Author)

AD-A075 559/5 PC A02/MF A01
Army Armament Research and Development Command Watervliet Ny Large Caliber Weapon Systems Lab
Calculated Shifts in Electronic States for FCC Hydrogen,
D. M. Gray , and A. M. Gray. Aug 79, 14p ARLCB-TR-79021, AD-E440 047
Pub. in Physical Review B, v19 n10 p5329-5335, 15 May 79.

First-order shifts in electron energy levels at k sub F and at high-symmetry points are calculated for hypothetical fcc hydrogen using a perturbation procedure in conjunction with the modified-plane-wave method. The shifts are calculated for hydrostatic, tetragonal, and trigonal strains. For the shear cases the numerical results satisfy symmetry requirements when tested.

DOE/JPL/954876-4 PC A02/MF A01
Battelle Columbus Labs., OH.
Development and Evaluation of die and Container Materials. Fourth Quarterly Progress Report, July 1--September 30, 1978.
R. R. Wills, and D. E. Niesz. 15 Oct 78, 24p
Contract NAS-7-100-954876

Mass spectrometric studies of molten silicon in contact with mullite and x = 0.75 beta ' Sialon show that the vapor pressures of Si, Si0, Al, and Al sub 2 0 species are very similar. In both cases the oxygen solubility is extremely low, but the aluminium content of the silicon is higher for the mullite--silicon system (3 weight percent), compared with 5000 ppm for the x = 0.75 beta ' Sialon. The nitrogen concentration (312 ppm) of the silicon is marginally below that for the Si sub 3 N sub 4 --silicon system indicating that the addition of aluminium and oxygen to beta Si sub 3 N sub 4 does stabilize the nitrogen to some extent. Silicon beryllium oxynitrides were fabricated by hot pressing Si sub 3 N sub 4 --BeO-SiO sub 2 mixtures using three Si sub 3 N sub 4 powders. Single phase materials were obtained with KBI, Inc. and Sylvania SN502 grade powders, but not with Sylvania SN402 grade powder. Preliminary evaluation of the silicon beryllium oxynitride materials with molten silicon did not reveal any attack of these materials. X = 0.75 beta ' Sialon did, however, undergo slight attack. It is suggested that the rate of dissolution of aluminium in molten silicon could be affected by whether the Sialon is used in an inert atmosphere or under vacuum conditions. (ERA citation 04:051241)

DOE/JPL/954901-4 PC A02/MF A01
RCA Labs., Princeton, NJ.
Development and Evaluation of die Materials for Use in the Growth of Silicon Ribbons by the Inverted Ribbon Growth Process. Task II: LSSA Project. Quarterly Report No. 4.
M. T. Duffy, S. Berkman, H. I. Moss, and G. W. Cullen. Sep 78, 17p
Contract NAS-7-100-954901

The results of emission spectroscopic analysis indicate that molten silicon (sessile drop) can remain in contact with hot-pressed Si sub 3 N sub 4 (99.2% theoretical density) for prolonged periods without attaining the impurity content level of the nitride. It is interesting to note that, although MgO was used as binder (approx. 3.8%), Mg was not found present in the silicon sessile drop in quantities much above the level initially present in the silicon source material. The conversion of CVD silicon oxynitride to beta -Si sub 3 N sub 4 can be carried out at high temperature in N sub 2 (approx. 1600 exp 0 C), by contact with molten silicon or by

a combination of these steps. Conversion in the presence of molten silicon appears preferable. Preliminary experiments with EFG-type dies coated with CVD Si sub 3 N sub 4 or CVD SiO/sub x/N/sub y/ indicate that capillary rise does not occur readily in these dies. The same was found to be true of hot-pressed and reaction-sintered Si sub 3 N sub 4 obtained commercially. However, when dies were formed by depositing CVD layers on shaped silicon slabs, a column of molten silicon (approx. 2.5 cm high) was maintained in each CVD die while being heated (approx. 30 min) in contact with a crucible of molten silicon. Preliminary wetting of dies appears necessary for EFG growth. Several ribbon growth experiments were performed in our new ribbon growth facility from V-shaped dies. Both CVD Si sub 3 N sub 4 and CVD SiO/sub x/N/sub y/ coatings were used on the die parts. There is also a problem with the wetting of SiO/sub x/N/sub y/ in the inverted ribbon growth process but not with Si sub 3 N sub 4 layers. After about 90 min in contact with the melt, however, silicon flows into the defining slot in the case of SiO/sub x/N/sub y/ coatings. (ERA citation 04:051242)

HMI-B-280 PC **A07**/MF **A01**
Hahn-Meitner-Inst. fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.).
Mechanisms of Conductivity in Thermally Oxidized Silicon Dioxide Doped by Ion Implantation.
D. Haack. 1978, 136p
In German.Thesis.
U.S. Sales Only.

Electrical investigations were performed on MOS varactors which had been thermally oxidized and annealed under various conditions, having Al and Mo electrodes and subjected finally to ion implantation. Several phosphorus implantations were superimposed to such an extent that after etching, a uniform impurity profile in the SiO sub 2 layer resulted. The MOS varactors are then after implantation thermally activated (annealing) and all varactors eletrically activated (formation). The theoretical foundations for the formulation of current-potential relationships are given and based on above all the Fowler-Nordheim tunnel effect, Poole-Frenkel effect and space charge limited conduction mechanisms. The results of the measurements are discussed under the following aspects: a) Influence of implantation; b) Influence of formation; and c) Comparison between formed pure and implanted oxide. (Atomindex citation 10:450473)

N79-32927/2 PC **A02**/MF **A01**
National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer.
Some Linear Differential Equation Problems in the Analysis of Dissolved Species in Cracks.
D. H. Feriss. Jan 79, 13p NPL-DNACS-14/79

Integral transform techniques are used to obtain solutions to partial differential equations arising in the analysis of diffusion of dissolved species in cracks in metals. The problems considered include steady and unsteady diffusion in one or two space dimensions for parallel sided cracks and steady one dimensional diffusion in a tapered crack.

N79-33512/1 PC **A07**/MF **A01**
European Space Agency, Paris (France).
Calculation of Stress Concentrations in Elastoviscoplasticity.
M. Chaudonnert. Apr 79, 144p ESA-TT-547, ONERA-P-1978-1
Tran-Transl. Into English of 'Calcul des Concentrations de Contrainte en Elastoviscoplasticite', Onera, Paris Report Onera-p-1978-1, 1978. Misc-Original Report in French Previously Announced as N79-18348.

Stress concentration is studied by means of structural calculations using the integral equation method. Problems related to the discontinuity of the stress vector are resolved by introducing double points, which also permits a coupling of the finite element method with the integral equation calculation method. The integral equation method, developed for the elasticity case, is extended to the elastoviscoplasticity case by means of a process of step by step linearization in time. The proposed method is valid for any constitutive law expressing the rate of viscoplastic strain in terms of the values of the viscoplastic strain, the stress, and one or more implicit parameters. A practical approximation method is developed that allows the time variation of the maximum stress at the bottom of the notch to be predicted in a simple manner. Some examples are given and the results are compared with those obtained by other methods of calculation (finite element method and exact analytic solutions) and by some experimental studies.

N79-34052/7 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Functional Integral Approach to the Static Susceptibility of the Anderson Model.
R. Kishore. May 79, 26p INPE-1491-RPE/035 Misc-Revised. Subm-Submitted for Publication.

The Coulomb interaction at the magnetic impurity is represented by the random fields coupled to the charge and the spin fluctuations. On treating the charge fluctuations within extremal approximation, the free energy functional is approximated by its potential part plus the harmonic terms in its kinetic part. Within this approximation, functional integral is evaluated over all the paths using transfer matrix technique. The static susceptibility reduces to an expression of a system of independent particles moving in one dimensional potential. In weak coupling limit U/pi delta 1, U is the Coulomb interaction at the impurity and Delta is the width of its virtually bound d state), it behaves like Pauli susceptibility and coincides with perturbation theory results, up to first order in U/pi delta. In strong coupling limits (U/pi delta 1), at low temperatures, it shows the tendency to saturation (Kondo effect) and, at high temperatures, behaves like a Curie susceptibility and coincides with the perturbation results, up to first order in Pi delta /U.

20M. Thermodynamics

AD-A075 303/8 Not available NTIS
Wisconsin Univ-Madison Dept of Physics
Three-Dimensional Heat-Flow Effects in Photoacoustic Spectroscopy of Solids,
R. S. Quimby , and W. M. Yen. 23 Feb 79, 4p ARO-13462.5-P
Grant DAAG29-76-G-0100
Availability: Pub. in Applied Physics Letters, v35 n1 p43-45, 1 Jul 79 (No copies furnished by DTIC).

No abstract available.

N79-32520/5 PC **A05**/MF **A01**
Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatiale.
Logiciel de Calcul des Coefficients de Couplages Radiatifs dans Une Enceinte Quelconque Extension au Calcul de la Repartition de Flux Incidents (A Computer Method for Calculating the Radiative Interchange Factors in a Complex Enclosure and an Extension of the Method to the Calculation of the Incident Flux Distribution Calmar).
C. Quere. Apr 79, 98p CNES-NT-89
In French; English Summary.

A method for computing radiative interchange factors in a complex enclosure with mixed diffuse or specular surfaces is described. The method simulates the physical phenonenon by tracking beams reflected within the enclosure. An extension of the method allows incident flux distribution on a structure to be calculated. The problem is first treated theoretically, then follows a detailed analysis of each step in the computer program. Input and output of the program, implemented on a CDC 7600, are also described. The applications of this calculation method to the simulation of satellite thermal behavior in orbit or to the analysis of the thermal conditions encountered in a space environment simulator are emphasized.

N79-32522/1 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Div.
Heat Balance Research with a Thin-Walled Cube in a Simulated Space Environment.
A. A. M. Delil, and J. F. Heemskerk. 1 May 78, 48p NLR-TR-78080-U

Heat balance research with a thin-walled cube was initiated to verify heat balance computer programs of the nodal network type. The heat balance experiments were carried out in a simulated space environment (inside a thermal-vacuum chamber with a liquid nitrogen cooled shroud, using a carbon arc solar simulator). The experimentally determined and the calculated temperature distributions agree very well when gas conduction inside the cube is included in the model. Supporting research to obtain input data for the heat balance experiments is described in the appendices. Included are an analytic solution for the heat balance of the cube, the measurement of the thermal conductivity of the cube wall material, the measurement of the thermal conductance of a rectangular bend in the wall material, the measurement of the thermal emissivity and solar absorptivity of the cube wall material, and a description of the calibration of the intensity distribution of the solar simulator beam.

20N. Wave Propagation

AD-A075 119/8 PC **A03**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
The Emission of an Elementary Slot Vibrator, Located in the Center of an Ideally Conducting Disk,
Yu. V. Pimenov , and L. G. Braude. 19 Jan 79, 32p Rept no. FTD-ID(RS)T-2240-78
Edited trans. of Antenny (USSR) Issue 6 p89-105 1969, by Joseph E. Pearson.

No abstract available.

AD-A075 278/2 PC **A03**/MF **A01**
Illinois Univ At Urbana-Champaign Electromagnetics Lab
Generalized Ray Optical Analysis of Reflection from a Smooth Convex Conducting Surface.
Scientific rept.,
R. Mittra , and A. M. Rushdi. Oct 79, 47p Rept nos. UIEM 79-12, UILU-ENG-79-2556
Contracts N00014-75-C-0293, AFOSR-77-3375

In certain applications involving reflection from smooth convex surfaces, the conventional geometrical optics method (GO) is not sufficiently accurate. In this paper a generalization of the conventional GO formulas is presented and closed-form expressions are derived. The derivation of the generalized geometrical optics (GGO) forumulas is based on the Fresnel transformation between two planes, one of which contains the spectral point, while the other passes through the observation point. The method developed herein improves the accuracy of GO with paying the high numerical cost of the physical optics integration. It is important, in particular, for computing the reflection characteristics of numerically specified surfaces. (Author

AD-A075 289/9 PC **A19**/MF **A01**
Mb Associates San Ramon Calif
Numerical Electromagnetic Code (NEC)-Method of Moments. A User-Oriented Computer Code for Analysis of the Electromagnetic Response of Antennas and other Metal Structures. Part I. Program Description-Theory. Part II. Program Description-Code.
Technical document,
G. J. Burke , and A. J. Poggio. 18 Jul 77, 433p NOSC-TD-116, AFWL-TR-76-320
Contract N00014-71-C-0187
See also Rept. no. MB-R-75/37, AD-A031 298 and Rept. no. MB-R-75/4, AD-A035 401.

The Numerical Electromagnetics Code (NEC-1) is a computer code for analyzing the electromagnetic response of an arbitrary structure consisting of wires and surfaces in free space or over a ground plane. The analysis is accomplished by the numerical solution of integral equations for induced currents. The excitation may be an incident plane wave or a voltage source on a wire while the output may include current and charge density, electric or magnetic field in the vicinity of the structure, and radiated fields. Hence, the code may be used for antenna analysis, EMP, or scattering studies. Part I of the document includes the equations on which the code is based and a discussion of the approximations and numerical methods used in the numerical solution. Some comparisons to demonstrate the range of accuracy of approximations are also included. Details of the coding and a User's

Guide are to be provided as parts II and III. (Author)

AD-A075 460/6 PC **A07/MF A01**
Naval Ocean Systems Center San Diego Ca
Numerical Electromagnetic Code (NEC) - Method of Moments. A User-Oriented Computer Code for Analysis of the Electromagnetic Response of Antennas and Other Metal Structures. Part III. User's Guide.
Technical document,
G. J. Burke , and A. J. Poggio. 18 Jul 77, 140p
NOSC/TD-PT-3, AFWL-TR-76-320-PT-3
See also Part 1 and 2, AD-A075 289.

The Numerical Electromagnetics Code (NEC-1) is a computer code for analyzing the electromagnetic response of an arbitrary structure consisting of wires and surfaces in free space or over a ground plane. The analysis is accomplished by the numerical solution of integral equations for induced currents. The excitation may be an incident plane wave or a voltage source on a wire, while the output may include current and charge density, electric or magnetic field in the vicinity of the structure, and radiated fields. Hence, the code may be used for antenna analysis, EMP, or scattering studies. This manual contains instruction for use of the Code, including preparation of input data and interpretation of the output. Examples are included that show typical input and output and illustrate many of the special options available in NEC-1. The examples exercise most parts of the Code and, hence, may also be used to check that the Code is operating correctly.

AD-A075 503/3 PC **A03/MF A01**
Lockheed Missiles and Space Co Inc Palo Alto Ca
Palo Alto Research Lab
Stimulated-Emission-of-Energetic-Particles (SEEP) Experiment.
Final rept. on phase 1.
Sep 79, 26p Rept no. LMSC/D678462
Contract N00014-78-C-0755

The immediate scientific objective of this stimulated-emission-of-energetic-particles (SEEP) program is to experimentally establish the detailed relationship between ground-based VLF transmitter activity (i.e. operating frequency, signal strength, pulse duration and duty cycle) and the characteristics of the resulting particle precipitation (intensity, energy and pitch angle distribution). Once these relationships are established an assessment can be made of the feasibility of using controlled wave-particle interactions as a selective method of precipitating electrons from the radiation belts onto critical communication links in the ionosphere. With this knowledge corrective actions to mitigate the effects of such activity against existing and planned U.S. Navy communication systems can be pursued.

N79-32447/1 PC **A05/MF A01**
Louvain Univ. (Belgium). Lab. de Telecommunications et d'Hyperfrequencies.
Atmospheric Propagation Research at 20 and 30 Ghz.
Final Report.
A. Vandervorst, P. Sobieski, and P. Delogne. Oct 78, 90p ESA-CR(P)-1201
Contract ESTEC-3305/77-NL-AK(SC)

One hundred and four articles are presented and a review is given of the present knowledge with respect to 20 and 30 GHz slant path propagation. The survey is limited to slant path and covers the frequency range from about 15 to 40 GHz. Experiments are presented first by location, which gives a more synthetic view on the subject, in a decreasing order of experiment complexity, then by subject where key diagrams are also presented. The problems due to the use of the 20/30 GHz range in satellite communication systems are then investigated, to outline possible experiments. The constraints arising from the atmospheric effects on the 20/30 GHz range are reviewed for the amplitude and phase of the copolar and of the cross-polar signal, both from an instantaneous and statistical point of view, including space diversity. The areas in which coordinated research is necessary are pointed out.

N79-33377/9 PC **A02/MF A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Comparison Between a Forecasting Method for the Propagation of HF and Data Obtained by Ionosondes Comparacao Entre a Previsao Para Propagacao Em HF E Dados Obtidos Por Ionossonda.
I. J. Kantor, and E. R. Depaula. Jul 79, 19p INPE-1521-RPE/057
Language in Portugese.

Data utilized with the purpose of forecasting the HF propagation is compared with the data obtained by ionosondes of INPE. The measurements of the critical frequency of the ionosphere helped in the evaluation of the errors associated with the forecasting method.

21. PROPULSION AND FUELS

21B. Combustion and Ignition

AD-A075 147/9 PC **A02/MF A01**
Cranfield Inst of Tech (England) School of Mechanical Engineering
Combustion Generated Heat Addition to a Ducted Supersonic Stream. II. Experimental Study,
R. A. Cookson , and J. J. Isaac. 28 Oct 77, 10p
AFOSR-TR-79-1042
Grant AFOSR-74-2698
Pub. in Acta Astronautica, v6 p531-539 1979. See also Part 1, AD-A075 150.

No abstract available.

AD-A075 150/3 PC **A02/MF A01**
Cranfield Inst of Tech (England) School of Mechanical Engineering
Combustion Generated Heat Addition to a Ducted Supersonic Stream. I. Theory.
Final rept. 1 Jun 74-31 May 78,
J. J. Isaac , and R. A. Cookson. 28 Oct 77, 22p
AFOSR-TR-79-1041
Grant AFOSR-74-2698
Pub. in Acta Astronautica, v6 p511-530 1979. See also AD-A075 147.

No abstract available.

ANL/EES-TM-57 PC **A02/MF A01**
Argonne National Lab., IL.
Pulse Combustion Technology for Heating Applications. Quarterly Progress Report, April 1–June 30, 1979.
F. W. Ahrens, J. M. Clinch, and S. W. Tam. Aug 79, 23p
Contract W-31-109-ENG-38

The primary purpose of this program is to develop design data and procedures for pulse combustion burners. The program will thus contribute to the accelerated industrial development of cost-effective, high-efficiency systems for a variety of heating applications. The major program tasks are designated as: burner performance studies, burner noise studies, and evaluation and application. Progress in these areas is reported. (ERA citation 04:052088)

BNL-51021 PC **A02/MF A01**
Brookhaven National Lab., Upton, NY.
Coal-Oil Mixture Combustion. Progress Report.
C. R. Krishna, T. A. Butcher, and L. D. Spaulding. Mar 79, 17p
Contract EY-76-C-02-0016

This year the main thrust of the work was towards examining specific aspects of the production, storage, and use of coal-oil mixtures (COMs) and establishing some areas in which more research is needed. The areas of stability (including the role of additives), atomization and combustion as they relate to coal-oil mixtures (COMs) were considered. The major conclusions are summarized below. Stability for pipeline transport may be attainable with proper design and coal particle size distribution (PSD) and storage stability could probably be accomplished with agitation, the agglomerating properties of the particles being important. The use of additives to promote stability involves considerations of supply and economics as well as of the chemical nature of the coal-oil interface which can depend on the type and history (oxidation, etc.) of the coal and oil. COM sprays may contain significant inhomogeneities and recent work on liquid spray combustion indicates that the atomization characteristics could strongly influence their combustion properties. Little is known of details of COM flames such as heat flux profiles and the measurement of these as functions of fuel and atomizer properties should aid in the design of COM combustors. (ERA citation 04:051091)

COO-4433-2 PC **A06/MF A01**
Northwestern Univ., Evanston, IL. Dept. of Mechanical Engineering.
Theoretical Studies on Heterogeneous Combustion. Progress Report, March 1, 1978–February 28, 1979.
C. K. Law. 1979, 106p
Contract EG-77-S-02-4433

In liquid-fueled chemical power plants, the fuel is usually introduced into the combustor in the form of a spray jet. This program aims to study the various heterogeneous processes involved during: (1) vaporization, ignition, deflagration, and extinction of single fuel droplets, and (2) the vaporization and ignition of the spray as a whole. During this period, the numerical modeling of unsteady droplet combustion in a reactive environment simulating the spray interior was completed. One basic feature of the classical droplet combustion theory, in which the instantaneous rate of fuel vaporization from the droplet is equal to the rate of fuel consumption at the flame, is questioned; a theory is formulated which shows that a significant portion of the fuel vaporized is actually used in filling up the space between the droplet and the flame instead of being consumed at the flame. The effect of possible condensation of ambient moisture on the spray vaporization rate was investigated. (ERA citation 04:052065)

METC/CR-78/10 PC **A12/MF A01**
West Virginia Univ., Morgantown. Dept. of Aerospace Engineering.
Fluidized Bed Flow Equations.
N. Ness, and J. B. Fanucci. Jul 78, 253p
Contract EY-77-C-21-8087

This report contains the detailed derivation of the conservation equations of mass, momentum, and energy for a fluidized bed. The development of the chemical production term is included in the Appendix. The equations contain momentum exchange terms, viscosity and thermal conductivity transport coefficients for the fluid and solid, and other flow quantities which require constitutive relations before a solution is attempted. An iterative procedure, involving fluidized bed test data and the solution of these flow equations, could be employed to model these constitutive relations. The equations are then specialized to the one dimensional, steady flow for a high-temperature two-phase chemically reacting multispecies fluid and a single species solid. Solutions to this system are discussed. (ERA citation 04:051095)

N79-32303/6 PC **A05/MF A01**
Notre Dame Univ., Ind. Dept. of Aerospace and Mechanical Engineering.
Feasibility Study of Liquid Pool Burning in Reduced Gravity.
Final Report, Jul. 1977 - Feb. 1979.
A. M. Kanury. Sep 79, 79p NASA-CR-159642, TR-79-1
Contract NAS3-21018

The feasibility of conducting experiments in the Spacelab on ignition and flame spread with liquid fuel pools which are initially at a temperature lower than the fuel's flash point temperature was studied. Theories were developed for the ignition and flame spread processes, and experiments were conducted to understand the factors influencing the ignition process and the spread rate. The results were employed to devise a conceptual Spacelab experiment which is expected to be feasible for a safe conduct and to be suitable for obtaining crucial data on the concerned processes.

N79-32314/3 PC **A05/MF A01**
Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
Early Formation of Nitrogen Oxides During Combustion of Hydrocarbons.
Master's thesis,

N. Avezard. 1978, 83p ONERA-NT-1978-4
Misc-Translation Is in Process as ESA-TT-579.
In French; English Summary.

The theoretical schemes determining the early NO concentrations were verified by comparison with experimental results obtained in a stirred combustor. The influence of water vapor on early NO formation, from both the experimental and theoretical viewpoints, is also emphasized. The experimental early NO, concentration in a Longwell type combustor, was determined to be the difference between the experimental NO and the thermal NO calculated using the Zeldovich mechanism, while taking into account an over-equilibrium of 0. A process involving HCN is suggested as an explanation of the phenomenon. The Miyauchi model, complemented by the Jachimowski reactions, accounts exactly for the experimental early NO with a residence time on the order of 1 ms; for higher residence times, the calculation is much more complex. Results on the influence of water on nitrogen oxides are presented. Calculations made it possible to determine this effect, which is essentially thermal for lean mixtures; it is more complex for rich mixtures.

N79-32315/0 PC **A04**/MF **A01**
Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
Influence of Turbulence on Hydrocarbon Combustion in a Stirred Combustor.
Master's thesis,
C. Bonniot. 1978, 54p ONERA-NT-1978-7
Misc-Translation Is in Process as Esa-TT-580.
In French; English Summary.

The reciprocal influence of turbulence and of combustion in the simple case of homogeneous turbulence, which corresponds to the primary zone of turbomachine combustors, was determined. A calculation method was developed; it allows, through reasonable simplifying assumptions, the calculation of the statistic characteristics of the flame. Experiments were carried out on a stirred at large scale combustor. The results of optical temperature measurements showed that the combustor presented good homogeneity. A maximum was determined for the characteristics mixing time, and this maximum is much lower than the mean residence time in the combustor. The influence of equivalence ratio fluctuations at injection was also studied. A simple calculation makes it possible to predict these ratios in the case of fluctuations with a low frequency relative to residence time; in the case of high frequency fluctuations, the calculation-experiment agreement is good qualitatively, but not quantitatively.

21C. Electric Propulsion

N79-33251/6 PC **A03**/MF **A01**
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
Charge-Exchange Plasma Environment for an Ion Drive Spacecraft.
H. R. Kaufman, and M. R. Carruth, Jr.. 1 Oct 79, 37p NASA-CR-162358, JPL-PUB-79-90
Contract NAS7-100

The charge exchange plasma environment around a spacecraft that uses mercury ion thrusters for propulsion is described. The interactions between the plasma environment and the spacecraft are determined and a model which describes the propagation of the mercury charge exchange plasma is discussed. The model is extended to describe the flow of the molybdenum component of the charge exchange plasma. The uncertainties in the models for various conditions are discussed and current drain to the solar array, charge exchange plasma material deposition, and the effects of space plasma on the charge exchange plasma propagation are addressed.

N79-33253/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Reduced Power Processor Requirements for the 30-cm Diameter Hg Ion Thruster.
V. K. Rawlin. 1979, 14p NASA-TM-79257, E-169
Conf-Presented at the 14TH Intern. Conf. On Electric Propulsion, Princeton, N. J., 30 Oct. - 1 Nov. 1979; Sponsored by Aiaa and Deutsche Gesselschaft fuer Luft- und Raumfahrt.

An evaluation of simplifications for the thruster power processor interface for a 30 cm Hg ion thruster is presented. Tests on the engine, thruster control, and the power supplies are performed. Reduced power processors requirements are defined and the impact on thruster design, performance, and lifetime are assessed.

N79-33254/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Preliminary Results of the Mission Profile Life Test of a 30 cm Hg Bombardment Thruster.
R. T. Bechtel, and E. L. James. 1979, 23p
NASA-TM-79261, E-175
Conf-Presented at 14TH Intern. Conf. On Electric Propulsion, Princeton, N. J., 31 Oct. - 2 Nov. 1979; Sponsored by Aiaa and Deutsche Gesselschaft fuer Luft- und Raumfahrt.

Long term tests were performed on a 30 cm Hg bombardment thruster and a power processing unit to determine lifetime characteristics. The thruster performance data and other operational characteristics taken at various times during the test segment are presented and evaluated with the life limiting mechanisms: discharge chamber erosion, deposition and spalling, external erosion, cathode degradation, and propellant isolator leakage. The control algorithms for thruster start up, steady state operation, throttle, detection and correction of off normal conditions, and shutdown are discussed.

21D. Fuels

AD-A075 121/4 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB Oh
Scientific Conference on 'Coal Gasification,'
J. Gawlik. 23 May 79, 24p Rept no. FTD-ID(RS)T-0432-79
Edited trans. of Koks Smora Gaz (Poland) v22 n3 p81-86 Mar 77, by E. Zolar.

No abstract available.

DOE/EV-0044 PC **A07**/MF **A01**
Department of Energy, Washington, DC.
Environmental Analysis of Synthetic Liquid Fuels.
12 Jul 79, 144p

Assuming application of the most effective environmental control technolgies and practices, deployment of synthetic liquids facilities on an accelerated schedule to 1990 appears feasible in terms of current environmental constraints. Yet-to-be-defined regulations, in their stringent forms, could change this finding. These regulations include visibility, short-term nitrogen oxide ambient standard, extension of prevention of significant deterioration (PSD) regulations, hazardous waste standards, toxic product regulations, and occupational safety standards. Any production level requires resolution of a number of institutional constraints, including permitting delays and the acceptability of the facility to the local population and state authorities. The greatest impediments for the first-generation technologies include long time delays, facility size limitations, and unwillingness to change the character of the community. There appears to be no absolute environmentally related constraint identified for any of the first-generation surface conversion technologies; second-generation processes run greater risks of major environmental problems. For in situ processes, the major risk is leaching of hazardous materials into water; for direct liquefaction, concern is potential worker and public exposure to toxic substances. Yet-to-be-defined regulations are perceived by developers as major technology development impediments. These include air quality standards (visibility, short-term nitrogen oxide and new PSD regulations), regulation of hazardous wastes and toxic products, underground injection guidelines, and worker safety regulations. Some risk exists that environmental R and D programs cannot fully satisfy all existing and expected regulatory demands, but these risks should be known by 1985 and it is expected that appropriate control adjustments can be made. (ERA citation 04:051003)

FE-1207-57 PC **A04**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development: Bi-GAS Process. Quarterly Report, October–December 1978.
Feb 79, 52p
Contract EX-76-C-01-1207

Catalysts BCR Lots No. 4120, 4121, and 4122 were subjected to an additional life test to determine more precisely the behavior of the catalysts within the temperature range of 800 to 1000 exp 0 F. On the basis of the overall results obtained, a PEDU-scale catalyst sample, based on No. 4122, was ordered from the supplier. Further bench-scale testing indicated that it should be possible to activate these catalysts adequately with a hydrogen-rich synthesis gas containing about 6% carbon monoxide (hydrogen/carbon monoxide ratio, approximately 12/1). Initial catalyst activities with this procedure were quite similar to those obtained in an earlier test when the samples were activated using pure hydrogen. On the other hand, catalyst activities did not increase significantly during the test, indicating that higher temperatures (above 950 exp 0 F) might be required in a PEDU test to achieve optimum catalyst activity. A life test of catalysts BCR Lots No. 4104, 4105, 4106, and 4107 was initiated to determine the effect on their thermal stability of adding various promoter metals to these nickel--molybdenum catalysts. Preliminary results indicate that the promoters were ineffective in enhancing thermal stability. PEDU Test No. 32 was conducted over the 5-day period of November 6 to 10, 1978. The catalyst used, a noble metal-promoted nickel catalyst, was the most active of any tested to date. It also showed greater methanation selectivity tha the BI-GAS pilot plant methanation catalyst. The data show that with this catalyst it was possible to obtain a product gas meeting pipeline quality specifications in a single pass through the fluidized bed methanator, without the need for polishing methanation (and without the need for secondary carbon dioxide removal). (ERA citation 04:050975)

FE-1517-71 PC **A07**/MF **A01**
Fluor Engineers and Constructors, Inc., Irvine, CA.
Coal Liquefaction Test Center. Quarterly Technical Progress Report, April–June 1978.
Mar 79, 140p
Contract EX-76-C-01-1517

The primary accomplishment of this quarter was the successful completion of Runs 008, 009, and 010. Summary data for these runs is shown in Table I. Run 008 extended for 130 hours on solvent/Dox oil, 15 hours on stored extract, and 6 hours on fresh extract (integrated operation). Run 009 involved Section 600 only, and ran from May 24 through June 1, with the section operating for 67 hours on solvent/Dox oil. Run 010 began on June 21, and for a 109-hour period, Section 600 - Hydrogeneration - was in stable operation on a recycle extract feed stock. The section was brought to stable operation on a 50% Dox oil--50% topped solvent feed. The D-A601D reactor had a catalyst charge, while the DA601A was used as a feed preheater and stabilizer for the feed stock. The concentration of extract in the feed was increased from 21% to 45% while reaction temperatures increased by 35 exp 0 F, from 745 to 780 exp 0 F. Desulfurization as high as 80% was experienced. Disappearance of extract (defined as process material boiling at 825 exp 0 F or higher) was about 27%. Over 7,000 gallons of heavy fuel oil was produced with average sulfur and ash contents of 0.3 and 0.13%, respectively. Run 010, which was terminated to permit work on an external natural gas supply line, demonstrated that stable operation can be achieved and maintained for a prolonged period. In addition, processing conditions have been established which provide a firm basis for setting conditions for future runs. The major problem during Run 010 continued to be the reliability of control instruments monitoring Unit 600 liquid streams. (ERA citation 04:051004)

FE-2218-25 PC **A04**/MF **A01**
Babcock and Wilcox Co., Lynchburg, VA. Materials and Chemical Technology Lab.
Improvement of the Mechanical Reliability of Monolithic Refractory Linings for Coal Gasification Process Vessels. Quarterly Progress Report, July 1978–September 1978.
1978, 73p
Contract EX-76-C-01-2218

The additional progress made on the mathematical model and the acoustic emission and strain gage measuring techniques is described and discussed. The post testing and heat-up test results on Lining number 5, a dual component monolithic lining run to 1850F in 150 psi steam are also described and discussed. Further proof of improved lining performance is presented. It has been achieved through the use of a 50% Al sub 2 O sub 3 refractory concrete in the dense component instead of a 90% Al sub 2 O sub 3 refractory concrete. This material has a low shrinkage and good creep resistance. Some evidence is presented that suggests the steam exposure may have enhanced the strength of the 50% Al sub 2 O sub 3 refractory concrete. (ERA citation 04:050977)

FE-2247-20 PC **A04/MF A01**
Texaco, Inc., South El Monte, CA. Montebello Research Lab.
Gasification of Residual Materials from Coal Liquefaction. Type III Extended Pilot Plant Evaluation of SRC-II Vacuum Flash Drum Bottoms from Kentucky No. 9/14 Coal.
A. M. Robin. Feb 79, 70p
Contract EX-76-C-01-2247

A Type III Extended Pilot Plant Evaluation of SRC-II vacuum flash drum bottoms obtained from the liquefaction of Kentucky No. 9/14 coal at Ft. Lewis, Washington was successfully completed at Texaco's Montebello Research Laboratory. A total of 31 tons of the SRC-II residue was gasified during eight pilot plant runs at 350 psig. Operating conditions were varied to determine the optimum. The dry syngas produced contained over 90 (vol) percent hydrogen plus carbon monoxide. No major operating problems were experienced and all of the key phases of the gasification were demonstrated. An estimate of operation for a commercial sized gasifier was prepared. (ERA citation 04:050978)

FE-2274-T1 PC **A07/MF A01**
West Virginia Univ., Morgantown. Dept. of Chemical Engineering.
Entrained-Bed Coal Gasification Modelling. Interim Report.
C. Y. Wen, and T. Z. Chuang. 1978, 126p
Contract EX-76-C-01-2274

A mathematical model has been developed to simulate the Texaco Downflow Entrained-Bed Pilot Plant Gasifier using coal liquefaction residues and coal-water slurries as feedstocks. The entrained-bed gasifier was conceptually divided into three zones: the Pyrolysis and Volatile Combustion Zone, the Gasification and Combustion Zone, and the Gasification Zone. The gas phase was assumed to be completely mixed at the entrance region followed by a region approximating plug flow. The solid phase was assumed to be a plug flow throughout the reactor. Temperature and concentration profiles along the reactor were obtained by solving the material and energy balances and taking into consideration the gasification kinetics, the transport rates and the hydrodynamics of the gasifier. The results of computation from the proposed model were compared with the experimental data. Sensitivity of the parameters used in the model was tested and optimum operating conditions were searched to provide a better understanding of the performance under various operating conditions utilizing the model. (ERA citation 04:050979)

FE-2286-32 PC **A25/MF A01**
Institute of Gas Technology, Chicago, IL.
Preparation of a Coal Conversion Systems Technical Data Book. Project 61003 Annual Report, May 1, 1977--April 30, 1978.
Feb 79, 577p
Contract EX-76-C-01-2286

In this report, we have discussed the calculation of gas phase fugacity in NH sub 3 --H sub 2 S--H sub 2 O and NH sub 3 --CO sub 2 --H sub 2 O systems. We have presented Vapor-Liquid Equilibrium data on cyclohexane-water and four binary hydrogen-solvent systems: H sub 2 -tetralin, H sub 2 -diphenylmethane, H sub 2 -1, methylnaphthalene and H sub 2 -bicyclohexyl. New data obtained on true densities of low rank coals and their chars are plotted as a function of hydrogen content (wt %, daf). Results of an investigation of formulas for calculating the heating value of coal from its composition are given. A new formula, developed from the available data and having the least standard deviation is also presented. Data on minor and trace elements in coal are reviewed. A table of basic properties of pure components of coal liquids is included. Properties of benzene are presented in both S.I. and British Units. We have discussed the theory of coal cleaning equipment and described the performance characteristics of dense-medium cyclones, hydroclones, concentrating tables, dense-medium coal vessels and Baum jigs. Equilibrium constants of various coal conversion and related reactions are tabulated and also given in graphical form. We have recommended Kouno and Saito's correlation for calculating pressure drop in vertical dilute phase lift lines. We have also discussed the general flow characteristics of gas-solids mixtures in horizontal lines and evaluated various correlations available in the literature for estimating saltation velocity by comparison with available experimental data. We also reviewed the literature on correlations for pressure drop calculations in dilute phase horizontal gas-solid flow systems. (ERA citation 04:051025)

FE-2307-46 PC **A03/MF A01**
Institute of Gas Technology, Chicago, IL.
Research and Development of Rapid Hydrogenation for Coal Conversion to Synthetic Motor Fuels (Riser Cracking of Coal). Third Quarter Report, October 1--December 31, 1978.
D. A. Duncan, J. L. Beeson, and R. D. Oberle.
Mar 79, 46p
Contract EX-76-C-01-2307

Work on processing of caking coals was continued, and methods of pretreating caking coals have been developed and demonstrated by successful runs in the bench-scale unit. Exploratory work was also done to evaluate the effects of bentonite clay, iron oxide, and heating rate on the reaction system. Both bentonite clay and iron oxide were found to have beneficial catalytic effects. Depth of carbon conversion was found to be more a function of severity of thermal treatment than heating rate over the range studied. Construction of the progress development unit (PDU) was continued, and much of the major equipment has been received. Contracts have been made for supplying high-pressure gases to the PDU. Fabrication of the preheater coil has been completed, and construction of the preheater furnace is underway. Tests were continued in a low-pressure simulator of a PDU combustor section, and for a coaxial construction, ceramic shields in the vicinity of the oxygen injection point do not appear to be necessary. (ERA citation 04:051007)

FE-2561-3 PC **A03/MF A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Conversion of Rapid City Pilot Plant, Phase II. Heat and Mass Balance Calculating Program for Pressurized Fluidized Bed Gasification Process; WEGAS User's Manual.
E. V. Somers, E. J. Vidt, and K. D. Weeks. Dec 78, 43p
Contract EF-77-C-01-2561

The pressurized fluidized bed coal gasification process has been modeled by a steady-state mass and energy balance program, WEGAS. Two alternative cold-gas desulfurization processes, Benfield and Selexol, have been integrated with the gasification model and are available for use in analyzing both the gasification model and integrated low Btu gas-fired combined cycle power plant. This report contains the User's Manual needed to use the program and a sample problem is presented to illustrate the input/output formats. (ERA citation 04:050982)

FE-2606-2 PC **A06/MF A01**
Institute of Gas Technology, Chicago, IL.
Coal Gasification Pilot Plant Support Studies. Project 61015 (Formerly 9030) Quarterly Report, July 1--September 30, 1978.
D. Q. Tran, S. P. Nandi, S. P. Singh, T. M. Knowlton, and S. A. Weil. Dec 78, 104p
Contract ET-78-C-01-2606

Various studies carried out in support of coal gasification are reported (kinetics, effect of mineral matter, efficiency, fluidized bed studies, coal preparation, treatments to reduce agglomeration, product and waste gas processing, etc.). (ERA citation 04:050985)

HCP/M2098-03 PC **A03/MF A01**
Mueller Associates, Inc., Baltimore, MD.
Status of Alcohol Fuels Utilization Technology for Stationary Gas Turbines.
Apr 79, 35p
Contract EX-76-C-01-2098

The primary objectives of the study were to: (1) determine if sufficient work has been performed in order to establish the feasibility of alcohols as fuels for stationary gas turbines, (2) determine if the status of technology has been defined regarding modifications necessary to convert existing stationary gas turbines for operation with alcohol fuels, and (3) determine if the status of technology has been defined for the design of new stationary gas turbines operating on alcohol fuels. Study results are presented in a format which first describes the test work performed and subsequently characterizes the status of alcohol fuels technology (relative to stationary gas turbines) based on this test work. The final chapter of this report presents an overview of various factors that, from a systems viewpoint, would need to be considered if a serious effort were made to utilize alcohols as fuels for stationary gas turbines. (ERA citation 04:051205)

LBL-8069 PC **A03/MF A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Diffusion of a Chemical Species Through a Viscous Boundary Layer.
J. Keller. Aug 78, 31p
Contract W-7405-ENG-48

The energy and species equation can be made to reduce to the same form under suitable assumptions. This result is discussed and used to determine the concentration difference of H sub 2 S in a highly corrosive coal gasification mixture. It is shown that the reaction rate is kinetically controlled and not diffusion limited. The possibility of using boundary layer control to prevent corrosion of the container walls is also investigated. It is shown that with a suitable injection gas the concentration of H sub 2 S at the surface can be reduced to a low enough level to stop the corrosion process. (ERA citation 04:050988)

N79-32637/7 PC **A03/MF A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Comparison of Alternate Fuels for Aircraft.
R. D. Witcofski. Sep 79, 38p NASA-TM-80155
Conf-Presented at the International Dglr/Dfir Symp. On Hydrogen in Air Transportation, Stuttgart, Germany, 11-14 Sep. 1979.

Liquid hydrogen, liquid methane, and synthetic aviation kerosene were assessed as alternate fuels for aircraft in terms of cost, capital requirements, and energy resource utilization. Fuel transmission and airport storage and distribution facilities are considered. Environmental emissions and safety aspects of fuel selection are discussed and detailed descriptions of various fuel production and liquefaction processes are given. Technological deficiencies are identified.

N79-33336/5 PC **A08/MF A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Jet Fuel Thermal Stability.
W. F. Taylor. 1979, 158p NASA-TM-79231
Conf-Workshop Held at Cleveland, 1-2 Nov. 1978.

Various aspects of the thermal stability problem associated with the use of broadened-specification and nonpetroleum-derived turbine fuels are addressed. The state of the art is reviewed and the status of the research being conducted at various laboratories is presented. Discussions among representatives from universities, refineries, engine and airframe manufacturers, airlines, the Government, and others are presented along with conclusions and both broad and specific recommendations for future stability research and development. It is concluded that significant additional effort is required to cope with the fuel stability problems which will be associated with the potentially poorer

quality fuels of the future such as broadened specification petroleum fuels or fuels produced from synthetic sources.

PB80-103906 Not available NTIS
National Bureau of Standards, Washington, DC.
The Density of Liquefied Natural Gas.
Final rept.,
W. M. Haynes, and R. D. McCarty. 1979, 7p
Pub. in Proceedings of the Gas Processors Association Annual Convention (58th) Held at Denver, CO. on March 19-21, 1979, p10-16 1979.

A project has been carried out at the National Bureau of Standards to provide a means for the accurate determination of the density of liquefied natural gas (LNG) that would serve as a basis for equitable custody transfer of this valuable commodity. A magnetic suspension densimeter was used to obtain a consistent set of density data for LNG components and their mixtures with a total uncertainty in density of less than 0.1%. These data were used to optimize and test mathematical models for LNG density calculations. Three mathematical models for the calculation of LNG densities have been optimized, tested, and compared. These models are an extended corresponding states model, a hard sphere model, and an empirical model due to Klosek and McKinley.

PB80-103914 Not available NTIS
National Bureau of Standards, Washington, DC.
How Safe Is Hydrogen.
Final rept.,
J. Hord. Jan 79, 31p
Pub. in Proceedings of the Hydrogen for Energy Distribution Symposium Held at Chicago, IL. on July 24-28, 1978, p613-643, Jan 79.

Just mention hydrogen and the subject of safety will arise. In this symposium, the safety features of hydrogen are systematically reviewed and compared with those of methane and gasoline. Intercomparisons with conventional fuels are necessary for us to assess the relative safety of hydrogen fuel. The basic technical data, available to the safety analyst, will be reviewed in this symposium. In addition, practical procedures, guidelines, standards, and regulations (applicable to the handling, storage and distribution of hydrogen) will be presented. Analytical and experimental research needs, relative to hydrogen safety, are defined and a state-of-the-art summary of hydrogen safety is given. Specifically, the following aspects of hydrogen safety will be addressed: safety procedures (handling, combustible gas detectors, H2 fire detectors, etc.); physical, chemical and combustion properties; leakage characteristics (flow mode, diffusion, buoyancy); ignition sources (weak and strong); fire and explosion hazards (fireball size and duration, thermal radiation, explosive potential, vapor cloud yields, overpressure, shrapnel, hazard summary charts); and mandatory and voluntary codes.

PB80-104383 Not available NTIS
National Bureau of Standards, Washington, DC.
Test of Densimeters for Use in the Custody Transfer of LNG.
Final rept.,
J. D. Siegwarth, J. F. LaBrecque, and B. A. Younglove. 1978, 6p
Pub. in Proceedings of the International School of Hydrocarbon Measurement (53rd) Held at Norman, OK. on April 11-13, 1978, p385-390 1978.

The NBS cryogenic fluids density reference system has been used to evaluate three basic types of densimeters: the vibrating element type, the dielectric cell type, and the displacement type. These meters were used to measure densities in liquid methane and liquid methane mixtures with ethane, propane, normal butane, and nitrogen. Measurements were made over the density range from 400 to 480 kg/cu m, temperatures from 108 to 130 K, and pressures from 1 to 3 bar. A hundred measurements were made at various densities, temperatures, pressures and compositions.

SAND-79-1400 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Coal Liquefaction Short Residence Time Process Research, 79-1. First Quarterly Report, October 1--December 31, 1978.
R. K. Traeger, and T. C. Bickel. Jul 79, 27p
Contract EY-76-C-04-0789

The bench scale coal liquefaction reactor is being modified to increase the accuracy of data required for kinetic studies, and to also extend the region of operation of the reactor. Preliminary concepts have been identified for residence time measurements and further studies are underway to evaluate performance under reaction conditions. Current concepts include: solid phase residence time--magnetic tracer particles or manganese oxide with neutron activation; and liquid phase residence time--reflectance IR or high speed sampling with an organic tracer, radioactive tracer. Limited viscosity and surface tension measurements have been performed in an effort to predict the reactor flow regime. (ERA citation 04:051012)

TID-29302 PC **A03**/MF **A01**
Physical Sciences, Inc., Woburn, MA.
Coal Processing for Fuel Cell Application. Task III: Fluidized Bed Gasifier Model. Task Report, July 1--October 31, 1978.
M. L. Finson. Nov 78, 37p
Contract EW-78-A-21-8450

The author has have outlined the essential elements of a computational model for fluidized bed gasification of coal. Many aspects are similar to existing models for catalytic reactors, although such features as the treatment of the coal particle inventory are apparently new. The proposed method of predicting the bubble size should also prove to be an improvement over existing empirical approaches. Of course, many details will have to be filled in during the actual construction of the computer program. An important aspect of developing the computer program will be the selection of an appropriate set of experimental results, against which to verify the model. It must be recognized that there are few detailed measurements of properties within a fluidized bed, simply because the fluidizing particles preclude the use of most fluid dianogistic techniques. More often, data will be limited to gas conversions and (with reacting coal particles) overall coal throughput rates. Catalytic reactors obviously represent a limited situation, but sufficiently high quality data would enable a good check on the aspects of the model dealing with gas mixing and conservation. The laboratory scale experiments with coal are of more interest, particularly those where pyrolysis does not account for all of the conversion. There may also be useful fluidized bed combustion data, although FB combustors often operate in the teeter bed regime. Finally, of course, it will be most desirable to obtain a decent set of performance data for one or more pilot plant fluidied bed gasifiers. (ERA citation 04:050991)

UCRL-52572 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Underground Coal Gasification Station at Lisichansk.
D. U. Olness. 19 Sep 78, 59p
Contract W-7405-ENG-48

This report continues our survey of the Soviet effort in underground coal gasification and summarizes the research conducted at Lisichansk from 1948 to 1963. This facility was operated primarily as an experimental-industrial station, and techniques for in situ coal gasification were developed and improved during this period. The stream method of gasification, which required mined shafts, was investigated first. By the late 1950's, improvements in methods and equipment enabled the Soviets to recover coal reserves at Lisichansk efficiently without using underground labor to create the necessary channels. This report discusses the geological, hydrological, chemical, technological, and economic factors affecting the construction, process optimization, operation, and maintenance of in situ gas generators. The available data for individual generators operated at Lisichansk during this period are also presented. (ERA citation 04:050992)

21E. Jet and Gas Turbine Engines

AD-A075 261/8 PC **A03**/MF **A01**
Mcdonnell Douglas Research Labs St Louis Mo
Unsteady Transonic Flows in a Two-Dimensional Diffuser.
Annual technical rept. 1 Apr 78-31 Mar 79,
M. Salben , and J. C. Kroutil. 31 May 79, 27p
AFOSR-TR-79-0990
Contract F49G20-77-C-0082

The second and third years of the contract comprise its second phase, aimed at exploring the effects of periodic, downstream excitation on the transonic flow in a two-dimensional diffuser model. The present report covers the second year of the contract. The pulse generator was incorporated in the diffuser model, and its controls were synchronized with the optical instrumentation. The boundary-layer control system was turned for best two-dimensionality of the flow. The flowfield instrumentation was selected, and an appropriate actuator was constructed. Perturbation of the flow by the actuator was determined to be acceptably small. Boundary-layer profiles were determined on all four walls, and the Mach number distribution was mapped in detail over the diffuser exit cross-section. Surface pressure distributions were measured, and spark schlieren photos were taken for the available pressure ratio range. (Author)

AD-A075 277/4 PC **A05**/MF **A01**
Boeing Wichita Co Ks
Jet Engine Class 'C' Test Cell Exhaust System Phase. Coanda/Refraction Noise Suppression Concept-Advanced Development.
Technical rept. Oct 76-Jan 77,
R. E. Ballard , and D. L. Armstrong. May 79, 89p
D3-11580-1, NAEC-92-113
Contract N00140-76-C-1229

The successfully demonstrated Coanda/refraction air-cooled exhaust noise suppressor system is applied to the Navy requirement for an effective air-cooled retrofit configuration for the class 'C' test cells (concrete enclosure). The technical approach consists of analytically sizing retrofit components to meet both acoustic ad aerothermodynamic requirements and then testing at one-sixth scale using simulated afterburning engine exhaust to verify the design configuration. Model variations included exhaust stack height, exhaust stack inner flow passage configurations (straight walls and diffuser) and removal of a concrete internal partition wall. Extensive data were recorded and analyzed to identify the aerothermodynamic trends related to these configuration changes. Results present recommendations for an air-cooled Coanda exhaust noise suppression system for retrofit of Navy class 'C' test cells. (Author)

AD-A075 501/7 PC **A12**/MF **A01**
Ohio State Univ Research Foundation Columbus
Investigation of the Boundary Layer Behavior on Turbine Airfoils.
Final rept. 16 Jun 75-15 Dec 78,
Lit S. Han , Wesley R. Cox , and Arnon Chait.
Aug 79, 274p OSURF-760256/784174, AFAPL-TR-79-2011
Contract F33615-75-C-2052

Smoke flow visualization, hot-wire anemometer, and pressure distribution studies were conducted to determine some of the wake and pressure surface boundary layer transition region characteristics along an enlarged two-dimensional turbine airfoil model in cascade. Smooth surface as well as rough surface airfoils were used in the study, which utilized a continuous, subsonic, specially built wind-tunnel. The flow provided a range of blade chord Reynolds numbers from 7.9E + 5 1.5E + 6 at turbulence levels of 0.6 to 0.8%. A pressure surface transition region was found to exist from about S/C = 0.43 to the trailing edge for the smooth surface airfoil, and up to S/C = 0.1 for a rough surface airfoil. The transition region for a smooth surface was initiated through the formation of Goertler vortices which were found to break down through the action of traveling Tollmein-Schlichting waves. Other phenomena observed include various trailing edge vortex formations which may be linked to the intermittency of the boundary layer near the trailing edge, and a low frequency traveling wave formed in conjunction with the appearance of traveling waves. An empirical relationship was developed for the traveling wave frequency. Comparison was made with stability theory and empirical methods of predicting transition. Linear stability theory was found to predict the Goertler wavelength, but not that of the traveling waves.

N79-32210/3 PC **A03**/MF **A01**
Joint Inst. for Advancement of Flight Sciences, Hampton, Va.

Acoustic Analysis of the Propfan.
Final Report.
F. Farassat, and G. P. Succi. 1979, 42p NASA-CR-162312
Contract NAS1-15154, Grant NSG-1474

A review of propeller noise prediction technology is presented. Two methods for the prediction of the noise from conventional and advanced propellers in forward flight are described. These methods are based on different time domain formulations. Brief descriptions of the computer algorithms based on these formulations are given. The output of the programs (the acoustic pressure signature) was Fourier analyzed to get the acoustic pressure spectrum. The main difference between the two programs is that one can handle propellers with supersonic tip speed while the other is for subsonic tip speed propellers. Comparisons of the calculated and measured acoustic data for a conventional and an advanced propeller show good agreement in general.

N79-32211/1 PC **A04**/MF **A01**
Pratt and Whitney Aircraft Group, East Hartford, Conn. Commercial Products Div.
Lean, Premixed, Prevaporized Fuel Combustor Conceptual Design Study.
Final Report.
A. J. Fiorentino, W. Greene, and J. Kim. Aug 79, 63p NASA-CR-159647, PWA-5626-12
Contract NAS3-21256

Four combustor concepts, designed for the energy efficient engine, utilize variable geometry or other flow modulation techniques to control the equivalence ratio of the initial burning zone. Lean conditions are maintained at high power to control oxides of nitrogen while near stoichometric conditions are maintained at low power for low CO and THC emissions. Each concept was analyzed and ranked for its potential in meeting the goals of the program. Although the primary goal of the program is a low level of nitric oxide emissions at stratospheric cruise conditions, both the ground level EPA emission standards and combustor performance and operational requirements typical of advanced subsonic aircraft engines are retained as goals as well. Based on the analytical projections made, two of the concepts offer the potential of achieving the emission goals; however, the projected operational characteristics and reliability of any concept to perform satisfactorily over an entire aircraft flight envelope would require extensive experimental substantiation before engine adaptation can be considered.

N79-32212/9 PC **A06**/MF **A01**
Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechanics.
Flow in Nonrotating Passages of Radial Inflow Turbines.
E. Baskharone, A. Hamed, and W. Tabakoff. Sep 79, 104p NASA-CR-159679
Grant NSG-3066

The analysis of irrotational incompressible flow field in the stator unit of a radial inflow turbine is presented. The solution in the combined scroll-nozzle assembly is complicated by the domain geometry and by its multiconnectivity. This model is necessary, however, in order to provide a better understanding of the mutual interaction effects of these two components on the flow field. The finite element method is used in the solution which is limited to the two dimensional case. A substructuring technique is adopted in the computational procedure and results in considerable savings in both computer time and core storage requirements. The results are presented for the flow velocity magnitude and direction in the scroll and through the various nozzles, for two nozzle blade geometries. In addition, the mass flow rates in the different nozzles are computed and their deviations from the mean value determined.

N79-32213/7 PC **A06**/MF **A01**
M and S Computing, Inc., Huntsville, Ala.
Standalone Engine Simulator (SAES), Engine Dynamics Simulator (EDS) Xerox sigma 5 Interface Hardware Manual.
P. M. Kirshten, S. Black, and R. Pearson. 17 Jul 79, 111p NASA-CR-161301, REPT-78-113
Contract NAS8-33244

The ESS-EDS and EDS-Sigma interfaces within the standalone engine simulator are described. The oepration of these interfaces, including the definition and use of special function signals and data flow paths within them during data transfers, is presented along with detailed schematics and circuit layouts of the described equipment.

N79-33204/5 PC **A04**/MF **A01**
Pratt and Whitney Aircraft Group, West Palm Beach, Fla. Government Products Div.
Laminated Turbine Vane Design and Fabrication.
Final Report, 20 Dec. 1976 - 20 Mar. 1979.
W. G. Hess. 19 Oct 79, 70p NASA-CR-159655, FR-11662
Contract NAS3-20587

A turbine vane and associated endwalls designed for advanced gas turbine engine conditions are described. The vane design combines the methods of convection cooling and selective areas of full coverage film cooling. The film cooling technique is utilized on the leading edge, pressure side, and endwall regions. The turbine vane involves the fabrication of airfoils from a stack of laminates with cooling passages photoetched on the surface. Cold flow calibration tests, a thermal analysis, and a stress analysis were performed on the turbine vanes.

N79-33205/2 PC **A04**/MF **A01**
General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
Analytical Evaluation of the Impact of Broad Specification Fuels on High Bypass Turbofan Engine Combustors.
Final Report.
J. R. Taylor. Aug 79, 75p NASA-CR-159641, R79AEG504
Contract NAS3-20799

Six conceptual combustor designs for the CF6-50 high bypass turbofan engine and six conceptual combustor designs for the NASA/GE E3 high bypass turbofan engine were analyzed to provide an assessment of the major problems anticipated in using broad specification fuels in these aircraft engine combustion systems. Each of the conceptual combustor designs, which are representative of both state-of-the-art and advanced state-of-the-art combustion systems, was analyzed to estimate combustor performance, durability, and pollutant emissions when using commercial Jet A aviation fuel and when using experimental referee board specification fuel. Results indicate that lean burning, low emissions double annular combustor concepts can accommodate a wide range of fuel properties without a serious deterioration of performance or durability. However, rich burning, single annular concepts would be less tolerant to a relaxation of fuel properties. As the fuel specifications are relaxed, autoignition delay time becomes much smaller which presents a serious design and development problem for premixing-prevaporizing combustion system concepts.

N79-33206/0 PC **A06**/MF **A01**
General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
CF6 Jet Engine Performance Improvement Program. Short Core Exhaust Nozzle Performance Improvement Concept.
W. A. Fasching. Sep 79, 113p NASA-CR-159564
Contract NAS3-20629

The short core exhaust nozzle was evaluated in CF6-50 engine ground tests including performance, acoustic, and endurance tests. The test results verified the performance predictions from scale model tests. The short core exhaust nozzle provides an internal cruise sfc reduction of 0.9 percent without an increase in engine noise. The nozzle hardware successfully completed 1000 flight cycles of endurance testing without any signs of distress.

N79-33210/2 PC **A07**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Effects of Diffusion Factor, Aspect Ratio and Solidity on Overall Performance of 14 Compressor Middle Stages.
W. R. Britsch, W. M. Osborn, and M. R. Laessig. Sep 79, 148p NASA-TP-1523, E-9943

A series of high hub tip radius ratio compressor stages representative of the middle and latter stages of axial flow compressors is discussed. The effects of aspect ratio, diffusion factor, and solidity on rotor and stage performance are determined. Fourteen middle stages are tested to study the effects on performance of varying both diffusion through the rotor and stator blades and blade aspect ratio. The design parameters in the streamline analysis program, the blade geometry program, and the blade coordinate program are presented.

21G. Reciprocating Engines

N79-32636/9 PC **A05**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Stirling Laboratory Research Engine Survey Report.
J. W. Anderson, and F. W. Hoehn. 15 Sep 79, 77p NASA-CR-162304, JPL-PUB-79-86
Contract NAS7-100

As one step in expanding the knowledge relative to and accelerating the development of Stirling engines, NASA, through the Jet Propulsion Laboratory (JPL), is sponsoring a program which will lead to a versatile Stirling Laboratory Research Engine (SLRE). An objective of this program is to lay the groundwork for a commercial version of this engine. It is important to consider, at an early stage in the engine's development, the needs of the potential users so that the SLRE can support the requirements of educators and researchers in academic, industrial, and government laboratories. For this reason, a survey was performed, the results of which are described.

21H. Rocket Motors and Engines

AD-A075 105/7 PC **A02**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France)
Technical Evaluation Report on the Propulsion and Energetics Panel 53rd Symposium on Solid Rocket Motor Technology.
Advisory rept.,
M. Barrere , W. H. Diesinger , and A. Homburg. Sep 79, 15p Rept no. AGARD-AR-151

Contents: Ignition, Extinction and Internal Ballistics; Burn Rate Modelling and Combustion of Metal; New Propellants; Combustion Instability; Heat Transfer and Materials; Testing and Instrumentation.

21I. Rocket Propellants

AD-A075 262/6 PC **E19**/MF **E19**
Johns Hopkins Univ Laurel Md Chemical Propulsion Information Agency
Jannaf Propulsion Meeting (1979), 6-8 March 1979, Anaheim, California. Volume I.
Meeting bulletin,
Karen L. Strange. Mar 79, 657p Rept no. CPIA-PUB-300-VOL-1
Contract N00024-78-C-5384
See also Volume 2, AD-B039 763.

This volume, the first of a planned five volume set, is a collection of the unclassified public release papers presented at the 1979 JANNAF Propulsion Meeting, held 6-8 March 1979 at Anaheim, California. The subjects discussed include research, development, test and engineering (RDT and E) advanced in solid, liquid, ramjet and gun propulsion systems. (Author)

AD-A075 371/5 PC **A03**/MF **A01**
George Washington Univ Washington D C Dept of Chemistry
'Mechanistic Studies of the Effect of Lead Salts on Double Base Propellant Combustion. The Use of Model Systems'.
Final rept. 1 Nov 75-31 Jul 79,
Joseph B. Levy , and Edward R. Johnson. Sep 79, 37p ARO-13249.1-C
Grant DAAG29-76-G-0087

In this program the effects of lead oxide (PbO) on the thermal decomposition of n-propyl nitrate have been studied as a model for double-base propellants containing lead salts as ballistic modifers. Only a small effect has been oberved with n-propyl

nitrate at the temperature range investigated, 157-186 degrees C, but in the course of this study a very powerful catalysis by lead oxide of the thermal decomposition of nitoralkanes was discovered and investigated in some detail. (Author)

AD-A075 550/4 PC **A05**/MF **A01**
Boeing Aerospace Co Seattle Wa
Application of Radioactive Tracer Techniques to Flow Decay Problems.
Final rept. 26 Mar -26 Oct 70,
James R. O'Brien , Kent E. Pullen , and T. Lynn Smith. Dec 70, 95p Rept no. D180-12741-1
Contract NAS7-779

In this program various applications of radioactive tracer techniques to flow decay problems were explored. The main object of the program was to develop a sensitive tool which could be used to detect the time, place, and degree of deposition of metal contaminants within various components of a propellant feed system. Such a tool was successfully developed and readily applied to flow studies involving nitrogen tetroxide and hydrazine. As an analytical tool, thermal neutron activation followed by gamma counting was shown to be a sensitive method for the quantitative analysis of a variety of metals in liquid propellants. For purposes of demonstration, the experimental investigation was limited to the metals iron, zinc, and chromium and the propellants hydrazine and nitrogen tetroxide. Both 'wet' and 'dry' analytical methods were employed. In the wet method the propellant and its contents were activated; in the dry method the residue left after the propellant had been evaporated was activated. The dry method was found to be more widely applicable to propellants and was simpler to employ. Limits of detection of 0.1, 0.01, and 0.001 parts per million (ppm) were found for iron, zinc, and chromium respectively.

N79-32263/2 PC **A03**/MF **A01**
Technische Universitaet, Munich (Germany, F.R.). Lehrstuhl fuer Raumfahrttechnik.
Aspekte Zur Leistungsvorhersage von Chemischen Raketentriebwerken (Aspects of the Performance of Chemical Rocket Thrust Systems).
M. Braitinger, H. O. Ruppe, and R. H. Schmucker. Sep 78, 48p TUM-LRT-RT-TB-78/3
Language in German.

An attempt is made to present an overall picture of current and future liquid fuel propellant rocket systems. Criteria concerning relative masses for thrust units, fuel and useful loads are examined. A schema is presented showing the various stages (injector, subsonic, transition, and supersonic regions) of the devices studied. The different losses affecting specific impulse, efficiency, and performance, such as kinetic energy, divergence, and boundary effects, are studied. Various calculation procedures (vigorous, simplified, and approximate) are proposed. It is concluded that some improvement in performance is probably feasible with current systems, but that work remains to be done on more advanced futuristic transport concepts.

N79-32369/7 PC **A05**/MF **A01**
Jet Propulsion Lab., Pasadena, Calif.
Experience with Fluorine and Its Safe Use as a Propellant.
D. L. Bond, M. E. Guenther, L. D. Stimpson, L. R. Toth, and D. L. Young. 30 Jun 79, 91p NASA-CR-162296, JPL-PUB-79-64
Contract NAS7-100

The industrial and the propulsion experience with fluorine and its derivatives is surveyed. The hazardous qualities of fluorine and safe handling procedures for the substance are emphasized. Procedures which fulfill the safety requirements during ground operations for handling fluorinated propulsion systems are discussed. Procedures to be implemented for use onboard the Space Transportation System are included.

22. SPACE TECHNOLOGY

22A. Astronautics

N79-32243/4 PC **A08**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (Germany, F.R.). Forschungsbereich Nachrichtentechnik und Erkundung.
Contributions to the 'Data Systems Engineering in Space Travel' Symposium.
8 Nov 78, 156p DLR-MITT-78-02
Conf-Presented at Symp. Sys. Eng. In Space Travel, Oberpfaffenhofen, West Ger., 18 Jan. 1978. Misc-Report Will Also Be Announced as Translation (ESA-TT-587).In German; English Summary.

The use of a process control computer as a component of complex systems, data handling for medical experiments in the space laboratory preprogram ASSESS 2, and computer assisted data acquisition for space flight are among the topics covered. A system for the interactive processing of picture data obtained from geostationary weather satellites is described. The application of computer controlled manipulations to underwater technology, the need for operational data handling in accurate satellite tracking, onboard autonomy in satellite control, and coupling of IBM and Siemens systems on a BJE basis as implemented in the regional computer center for the universities of Mannhein and Heidelberg are included. The use of the OMS - MVS operational system in technical scientific fields, software and PROINF applications with EBOSIPES, and process control for RIT 10 lifetime tests is discussed.

N79-32246/7 PC **A04**/MF **A01**
Dornier-System G.m.b.H., Friedrichshafen (Germany, F.R.).
Study on Expenditure Optimization for Satellite and Spacelab Experiments.
Final Report.
H. Siemann, and H. Wagner. Dec 78, 61p BMFT-FB-W-78-34
Contracts BMFT-WRT-1077, DFVLR-BPT-01-OO-187
In German; English Summary.

A system of objectives was elaborated in order to derive recommendations for expenditure optimization for satellite and Spacelab experiments. It is recommended to apply in both cases a two-model philosophy where the flight unit is equipped with integrated circuits qualified according to Mil-Std.-833, Method 5004, Class B. As for product assurance the optimum is a program requiring approximately 8% of the total program costs.

N79-32248/3 PC **A02**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (Germany, F.R.).
Proposal for an Interplanetary Mission to Sound the Outer Regions of the Solar Corona.
H. Porsche, H. Volland, M. K. Bird, and P. Edenhofer. 1978, 18p

A mission is proposed to continuously investigate the medium and outer regions of the corona by coronal sounding. The main task would be the sounding of the solar corona by a spacecraft orbiting the sun such that it is standing continously near superior conjunction. The orbit period is then exactly one year. A small inclination of the orbit combined with a small eccentricity causes the spacecraft to virtually encircle the solar disk in a small offset distance as seen from the earth. The minimum payload for the mission is described, including uplink and downlink operation at S and X band frequencies, range rate Doppler measurements, electron content, and Faraday rotation. An additional sun backside payload and on interplanetary payload is also suggested.

N79-32249/1 PC **A03**/MF **A01**
Oesterreichische Akademie der Wissenschaften, Vienna.
Space Activity in Austria, 1978/79.
F. Steinhauser. Apr 78, 27p
Conf-Presented at 22D Cospar Plenary Meeting and Assoc. Activities, Bangalore, India, 29 May-9 Jun. 1979.

The activities of the Austrian Solar and Space Agency (ASSA) along with those of its associated institutions are reported. The participation of ASSA in the ESA SPACELAB program is discussed in detail. Individual synopses of the space research activities of each of the ASSA associate institutions include descriptions of rocket sounding programs, studies of solar activity effects, a synoptic approach to meteorology, a geochemical study of primitive samples from the earth and moon, and a discussion of spectroscopic observations of stellar phenomena.

N79-32260/8 PC **A03**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Technology Div.
Multiple Attitude Maneuvers for a Spinning Spacecraft Disturbed by Solar Radiation.
P. T. L. M. Vanwoerkom. 5 Feb 78, 46p NLR-TR-78078-U

The attitude motion of interplanetary, spinning spacecraft under the influence of solar radiation and optimal thrusting was investigated. A general model was formulated to describe the forces and torques exerted on the spacecraft due to solar radiation. The model was compared with models available in the large body of literature on the subject. It is found to be mathematically equivalent to a generalized model developed previously for the description of interaction between spacecraft and atmosphere. A geometrical description of the uncontrolled attitude motion is presented. The relevant attitude parameters can be estimated using a simple solar sensor. Assuming pulsed jet microthrusting, both single attitude maneuvers and multiple attitude maneuvers are optimized; the former with respect to fuel mass consumed in a single maneuver, the latter with respect to time elapsed between consecutive single maneuvers. The maneuver sequence is described geometrically.

N79-32261/6 PC **A06**/MF **A01**
National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Technology Div.
Survey of Modern Control and Observation Theory for Disturbed, Target Following Aerospace Systems. Part 2: Stochastic Performance and Spacecraft Application.
P. T. L. M. Vanwoerkom. 6 Apr 78, 111p NLR-TR-78082-U-PT-2
Contracts NIVR-1780, NIVR-1858

The high accuracy attitude control of a one-dimensionally rotating spacecraft, equipped with a noisy attitude sensor and a noisy reaction wheel for attitude control, acted upon by a noisy external disturbing torque, and required to execute a desired or target attitude motion is discussed. Stochastic stability properties of the closed loop system are investigated, both analytically and geometrically. The results obtained are compared with those of other modern attitude control designs as well as with those of classical attitude control designs.

N79-33121/1 PC **A04**/MF **A01**
Stanford Univ., Calif. Guidance and Control Lab.
Control System Designs for the Shuttle Infrared Telescope Facility.
J. D. Powell, E. K. Parsons, and K. R. Lorell. Oct 79, 59p NASA-CR-162321
Grant NSG-2246

The stringent pointing and stability requirements of the Shuttle Infrared and Telescope Facility (STIRF) are stressed as well as the demands that infrared astronomy and the STIRF in particular place on the design of the pointing system.

N79-33132/8 PC **A05**/MF **A01**
Max-Planck-Inst. fuer Astronomie, Heidelberg (Germany, F.R.).
The Zodiacal Light Experiment E9 on Helios A and B.
Final Report.
C. Leinert, E. Pitz, H. Link, and N. Salm. Dec 78, 88p BMFT-FB-W-78-28
Contracts BMFT-WRS-0107-I, GFW-01-H-3009-I
In German; English Summary.

The zodiacal light experiment on board the space probes Helios A and B is described. The experiment was to measure intensity and polarization of the zodiacal light in three broad spectral ranges: U (360 nm), B (420 nm), and V (540 nm) at ecliptic latitudes of beta = + or - 16 deg, + or - 31 deg, and + or - 90 deg. A detailed account of the experimental design, including discussion of the hardware used, is given and complete results obtained are shown.

N79-33225/0 PC **A14/MF A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Report on Active and Planned Spacecraft and Experiments.
R. W. Vostreys, and R. Horwitz. Aug 79, 319p
NASA-TM-80505, NSSDC/WDC-A-R/S-79-03

Information concerning concerning active and planned spacecraft and experiments known to the National Space Science Data Center are included. The information contains a wide range of disciplines: astronomy, earth sciences, meteorology, planetary sciences, aeronomy, particles and fields, solar physics, life sciences, and material sciences. These spacecraft projects represent the efforts and funding of individual countries as well as cooperative arrangements among different countries. Approximately 850 articles are included.

N79-33226/8 PC **A05/MF A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
Summaries of Early Materials Processing in Space Experiments.
R. J. Naumann, and D. Mason. Aug 79, 83p
NASA-TM-78240

Objectives, methods, and results of low-gravity materials processing experiments are summarized, and a bibliography of published results for each experiment is provided. Included are drop tower experiments, the Apollo demonstration experiments, the skylab experiments and demonstration experiments, and the Apollo-Soyuz experiments and demonstrations. The findings of these experiments in the fields of crystal growth, metallurgy, and fluid behavior are summarized.

N79-33227/6 PC **A14/MF A01**
Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.
Extraterrestrial Processing and Manufacturing of Large Space Systems, Volume 1, Chapters 1-6.
Final Report.
R. H. Miller, and D. B. S. Smith. Sep 79, 307p
NASA-CR-161293-V-1, SSL-15-79
Contract NAS8-32925
Seri-3.

Space program scenarios for production of large space structures from lunar materials are defined. The concept of the space manufacturing facility (SMF) is presented. The manufacturing processes and equipment for the SMF are defined and the conceptual layouts are described for the production of solar cells and arrays, structures and joints, conduits, waveguides, RF equipment radiators, wire cables, and converters. A 'reference' SMF was designed and its operation requirements are described.

N79-33228/4 PC **A21/MF A01**
Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.
Extraterrestrial Processing and Manufacturing of Large Space Systems, Volume 2, Chapters 7-14 and Appendices.
Final Report.
R. H. Miller, and D. B. S. Smith. Sep 79, 482p
NASA-CR-161293-V-2, SSL-16-79
Contract NAS8-32925
Seri-3.

Production and support equipment specifications are described for the space manufacturing facility (SMF). Defined production equipment includes electromagnetic pumps for liquid metal, metal alloying furnaces, die casters, electron beam welders and cutters, glass forming for structural elements, and rolling. A cost analysis is presented which includes the development, the aquisition of all SMF elements, initial operating cost, maintenance and logistics cost, cost of terrestrial materials, and transportation cost for each major element. Computer program listings and outputs are appended.

N79-33229/2 PC **A04/MF A01**
Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.
Extraterrestrial Processing and Manufacturing of Large Space Systems. Volume 3: Executive Summary.
Final Report.
R. H. Miller, and D. B. S. Smith. Sep 79, 51p
NASA-CR-161293-V-3, SSL-17-79
Contract NAS8-32925
Seri-3.

Facilities and equipment are defined for refining processes to commercial grade of lunar material that is delivered to a 'space manufacturing facility' in beneficiated, primary processed quality. The manufacturing facilities and the equipment for producing elements of large space systems from these materials and providing programmatic assessments of the concepts are also defined. In-space production processes of solar cells (by vapor deposition) and arrays, structures and joints, conduits, waveguides, RF equipment radiators, wire cables, converters, and others are described.

N79-34015/4 PC **A03/MF A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Ultraviolet Absorption of Common Spacecraft Contaminants.
J. A. Colony. Aug 79, 28p NASA-TM-80551

Organic contamination of ultraviolet optical systems is discussed. Degradation of signal by reflection, scattering, interference, and absorption is shown. The first three processes depend on the physical state of the contaminant while absorption depends on its chemical structure. The latter phenomenon is isolated from the others by dissolving contaminants in cyclohexane and determining absorption spectra from 2100A to 3600A. A variety of materials representing the types of contaminants responsible for most spaceflight hardware problems is scanned and the spectra is presented. The effect of thickness is demonstrated for the most common contaminant, di(2 ethyl hexyl)phthalate, by scanning successive dilutions.

22B. Spacecraft

AD-A075 126/3 PC **A02/MF A01**
Foreign Technology Div Wright-Patterson AFB Oh
Space War.
23 May 79, 17p Rept no. FTD-ID(RS)T-0619-79
Edited trans. of Hang K'ung Chih Shih (China) n8 p7-9 Aug 78, by Sally C. Haines.

No abstract available.

AD-A075 189/1 PC **A02/MF A01**
Foreign Technology Div Wright-Patterson AFB Oh
Space War Meteors,
Shih Lan. 6 Jun 79, 16p Rept no. FTD-ID(RS)T-0593-79
Edited trans. of Hang K'ung Chic Shih (China) n8 p7-9 Aug 78, by J. Wing.

No abstract available.

AD-A075 198/2 PC **A02/MF A01**
Foreign Technology Div Wright-Patterson AFB Oh
Artificial Heavenly Palaces,
Shu Tain. 11 Jun 79, 14p Rept no. FTD-ID(RS)T-0610-79
Edited trans. of Hang K'ung Chih Shih (China) n12 p27-29 1978, by Fang-Ling Needham.

No abstract available.

AD-A075 471/3 PC **A02/MF A01**
Stanford Research Inst Menlo Park Calif
Field Compensating Scattering Structures in ARES for Dispersed EMP Testing of Satellites.
Technical memo.,
S. Dairiki. Apr 75, 9p Rept no. SRI-TM-1
Contract DNA001-74-C-0105

Measurements up to 130 MHz in the ARES show non-uniform field variations of 10 dB. Similar measurements of the field within a 1/30 scale model of the ARES show similar results. Three different scattering structures tested in the ARES model eliminated the field non-uniformity caused by signal reflections at equivalent frequencies higher than 30 MHz. current measurement on models of the structures of the fleet communications satellite in the ARES model indicates that a scattering structure is necessary. Resonances that occur below 25 MHz on the wire top plate of the ARES can be tolerated. A potentially inexpensive and effective scattering structure made by stringing wires in the terminating half of the ARES was designed and is recommended for the ARES. (Author)

AD-A075 602/3 MF **A01**
Army Electronics Research and Development Command Wsmr Nm Atmospheric Sciences Lab
Satellite Calibration Data. Annual Data Report - 1977.
Rept. for Jan-Dec 77,
Louis I. Murillo , and L. Edwin Williamson. Aug 79, 402p Rept no. ERADCOM/ASL-DR-79-0001
Availability: Document partially illegible.

This report contains data from observations of meteorological and radiative parameters at selected satellite calibration target sites. These site include the highly reflective gypsum field in southcentral New Mexico, a dark lava surface, a nearby fresh water reservoir and over desert terrain. The report also contains narrative descriptions of the instruments in use at the target sites. (Author)

N79-32244/2 PC **A14/MF A01**
Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Unternehmensbereich Raumfart.
Ariane Passenger Experiment (Apex): Planning Study.
Final Report.
H. V. Bassewitz, H. Bassner, K. Bohnhoff, K. Fetzer, and H. Imbiel. Dec 77, 323p BMFT-FB-W-77-24
Contracts BMFT-WRT-1075, DFVLR-BPT-01-YA-016
In German; English Summary.

Th ARIANE development flight L04, scheduled for Dec. 1980, offers the possibility of flying a passenger test satellite at low cost. Such a passenger would allow for testing and flight-qualification of satellite application components newly developed and ground tested or currently under development. This mission goal, its feasibility, and the costs necessary to its achievement were studied. Three passenger satellite alternatives, all based on the same satellite platform bus, were compared. These are: (1) a double-U structure (INTELSAT 5) equipped with a unified propulsion system plus an ion drive for attitude corrections, an ultralight panel solar generator, and two KfK offset antennas with 2 m diameter apertures; (2) a modular structure equipped with a unified propulsion system plus a hyrazine rocket, and the same solar power unit and antenna array as the first as well as additional ESA experiments; and (3) a double-U structure (INTELSAT 5) equipped with a central engine plus a liquid propellant stabilizing system, a modified solar power unit, a French-German jointly developed antenna array, and spin stabilized transfer with an active nutation damper. No final passenger satellite configuration has as yet been chosen.

N79-32245/9 PC **A12/MF A01**
Erno Raumfahrttechnik G.m.b.H., Bremen (Germany, F.R.).
Requirements Analysis and Feasibility Study for the Spacelab User Program: Supersensitive Optical Accelerometer.
Final Report.
W. Knabe, F. Hock, H. Klotz, T. Miski, and W. R. Ilenburg. Aug 78, 268p BMFT-FB-W-78-18
Contracts BMFT-WRT-1076, DFVLR-BPT-01-QV-316
In German; English Summary.

Proceeding from a comparative appraisal of the accelerometers used in aeronautics and astronautics, the spectrum of applications of, as well as the need for, a supersensitive acceleration sensor was determined in regard to the planned or already initiated space activities of the Federal Republic of Germany. Keyed specifically to the needs of the Spacelab utilization program, an optical acceleration sensor for weak acceleration fields (1/1000 g) was conceptually developed and formulated. Also, its feasibility was demonstrated regarding its role as an autonomous measuring instrument for residual accelerations and as a sensor component in a control loop for compensating existing perturbative accelerations (drag-free system). A preliminary instrument design of an autonomous accelerometer for use in the Spacelab module is presented and its construction is described.

N79-32255/8 PC **A02/MF A01**
National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Technology Div.

Some Investigations on the Notching Procedure Used in Shaker Tests on Satellites.
H. H. Ottens. Apr 79, 21p NLR-TR-76134-U
Contract NIVR-1778

The notching procedure as used in the shaker test on a satellite is critically examined. Instead of the notching procedure, an alternative test set-up in which the dynamic interaction between launcher and spacecraft is taken into account, was proposed and investigated for a simple model of launcher and satellite. Using this test set-up the response levels near the resonance frequency of the satellite is found to be too high as compared with the allowable notch level. This difference is mainly caused by the fact that simulating sinusoidal shaped transients by a sine sweep test is conservative.

N79-32358/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Effect of 25 Cycles of Launch Pad Exposure and Simulated Mission Heating on Space Shuttle Reusable Surface Insulation Coated with Reaction Cured Glass.
P. O. Ransone, J. D. Morrison, and J. E. Minster. Sep 79, 21p NASA-TM-80160

Tiles of space shuttle reusable surface insulation coated with reaction cured glass were subjected to 25 cycles of launch pad exposure and simulated mission heating. The coating could not withstand the environment without cracking. Water absorption after cracking reached as high as 150 weight percent. Exposure of insulation fibers beneath the coating to contaminants dissolved in absorbed water initiated fiber degradation.

N79-33233/4 PC **A06**/MF **A01**
Smithsonian Astrophysical Observatory, Cambridge, Mass.
System Noise Analysis of the Dumbbell Tethered Satellite for Gravity-Gradient Measurements.
Final Technical Report, 1 Jul. 1978 - 30 Jun. 1979.
G. Colombo. Oct 79, 108p NASA-CR-162333
Grant NSG-8063

An analysis of the dumbbell gravity gradiometer concept for measuring short wavelength variations in the earth's gravity gradient is presented. Variations in the gradient are recorded by measuring tension variations in a vertically stabilized satellite consisting of heavy masses connected by a long wire or rod. Tension noise arises from the excitation of various mechanical oscillations of the system. The principal noise sources that were identified are fluctuations in atmospheric drag heating and drag force resulting from density variations and winds. Approximate analytical expressions are presented for the tension noise as a function of the system design parameters for various possible configurations. Computer simulations using numerical integration were performed to study the tension noise for several sample cases. Three designs consistent with Shuttle launch capabilities are discussed.

N79-33235/9 PC **A05**/MF **A01**
Aerojet Liquid Rocket Co., Sacramento, Calif.
Orbit Transfer Vehicle (OTV) Engine, Phase A Study. Volume 1: Executive Summary.
Final Report.
J. A. Mellish. 29 Jun 79, 100p NASA-CR-161297, REPT-32999-F-V-1
Contract NAS8-32999

Design and parameteric data for the hydrogen oxygen engine used in the orbiter transfer vehicle is presented. The engine design is analyzed and minimum engine performance and man rating requirements are discussed. Candidate cycle performance, weight and tradeoff analysis, and cost estimates are reported.

N79-33236/7 PC **A12**/MF **A01**
Aerojet Liquid Rocket Co., Sacramento, Calif.
Orbit Transfer Vehicle (OTV) Engine, Phase A Study. Volume 2: Study.
Final Report.
J. A. Mellish. 29 Jun 79, 261p NASA-CR-161298, REPT-32999-F-V-2
Contract NAS8-32999

The hydrogen oxygen engine used in the orbiter transfer vehicle is described. The engine design is analyzed and minimum engine performance and man rating requirements are discussed. Reliability and safety analysis test results are presented and payload, risk and cost, and engine installation parameters are defined. Engine tests were performed including performance analysis, structural analysis, thermal analysis, turbomachinery analysis, controls analysis, and cycle analysis.

N79-33237/5 PC **A03**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 1: Executive Summary.
Aug 79, 28p NASA-CR-160321, MDC-G7870-V-1
Contract NAS9-15532
Seri-12.

An array deployment assembly, power regulation and control assembly, the necessary interface, and display and control equipment comprise the power extension package (PEP) which is designed to provide increased power and duration, as well as reduce fuel cell cryogen consumption during Spacelab missions. Compatible with all currently defined missions and payloads, PEP imposes minimal weight and volume penalties on sortie missions, and can be installed and removed as needed at the launch site within the normal Orbiter turnaround cycle. The technology on which it is based consists of a modified solar electric propulsion array, standard design regulator and control equipment, and a minimally modified Orbiter design. The requirements from which PEP was derived, and the system and its performance capabilities are described. Features of the recommended project are presented.

N79-33238/3 PC **A07**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 2: PEP.
Aug 79, 135p NASA-CR-160322, MDC-G7870-V-2
Contract NAS9-15532
Seri-12.

User power, duration, and orbit requirements, which were the prime factors influencing power extension package (PEP) design, are discussed. A representative configuration of the PEP concept is presented and the major elements of the system are described as well as the PEP-to-Orbiter and remote manipulator interface provisions.

N79-33239/1 PC **A11**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 3: PEP Analysis and Tradeoffs.
Aug 79, 246p NASA-CR-160323, MDC-G7870-V-3
Contract NAS9-15532
Seri-12.

The objectives, conclusions, and approaches for accomplishing 19 specific design and analysis activities related to the installation of the power extension package (PEP) into the Orbiter cargo bay are described as well as those related to its deployment, extension, and retraction. The proposed cable handling system designed to transmit power from PEP to the Orbiter by way of the shuttle remote manipulator system is described and a preliminary specification for the gimbal assembly, solar array drive is included.

N79-33240/9 PC **A05**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 4: PEP Functional Specification.
Aug 79, 76p NASA-CR-160324, MDC-G7870-V-4
Contract NAS9-15532
Seri-12.

The functional, performance, design, and test requirements for the Orbiter power extension package and its associated ground support equipment are defined. Both government and nongovernment standards and specifications are cited for the following subsystems: electrical power, structural/mechanical, avionics, and thermal control. Quality control assurance provisions and preparation for delivery are also discussed.

N79-33241/7 PC **A03**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 5: PEP Environmental Specification.
Aug 79, 45p NASA-CR-160325, MDC-G7870-V-5
Contract NAS9-15532
Seri-12.

This specification establishes the natural and induced environments to which the power extension package may be exposed during ground operations and space operations with the shuttle system. Space induced environments are applicable at the Orbiter attach point interface location. All probable environments are systematically listed according to each ground and mission phase.

N79-33242/5 PC **A03**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 6: PEP Product Assurance.
Aug 79, 27p NASA-CR-160326, MDC-G7870-V-6
Contract NAS9-15532
Seri-12.

Safety, reliability and quality assurance design analysis results are presented as well as design requirements recommended for implementation in the PEP design.

N79-33243/3 PC **A02**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 7: PEP Logistics and Training Plan Requirements.
Aug 79, 20p NASA-CR-160327, MDC-G7870-V-7
Contract NAS9-15532
Seri-12.

Recommendations for logistics activities and logistics planning are presented based on the assumption that a system prime contractor will perform logistics functions to support all program hardware and will implement a logistics system to include the planning and provision of products and services to assure cost effective coverage of the following: maintainability; maintenance; spares and supply support; fuels; pressurants and fluids; operations and maintenance documentation training; preservation, packaging and packing; transportation and handling; storage; and logistics management information reporting. The training courses, manpower, materials, and training aids required will be identified and implemented in a training program.

N79-33244/1 PC **A03**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 9: PEP Design, Development and Test Plans.
Aug 79, 45p NASA-CR-160328, MDC-G7870-V-9
Contract NAS9-15532
Seri-12.

A plan for the production of two PEP flight systems is defined. The task's milestones are described. Provisions for the development and assembly of new ground support equipment required for both testing and launch operations are included.

N79-33245/8 PC **A04**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 10: PEP Project Plan.
Aug 79, 70p NASA-CR-160329, MDC-G7870-V-10
Contract NAS9-15532
Seri-12.

Contents: project plan summary; project and mission objectives; related studies and technology support activities; technical summary; management; procurement approach; project definition items and schedule; resources; management review; controlled items; and safety, reliability, and quality assurance.

N79-33246/6 PC **A03**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 11: PEP, Cost, Schedules, and Work Breakdown Structure Dictionary.
Aug 79, 38p NASA-CR-160330, MDC-G7870-V-11
Contract NAS9-15532
Seri-12.

Cost scheduling and funding data are presented for the reference design of the power extension package. Major schedule milestones are correlated with current Spacelab flight dates. Funding distributions provide for minimum expenditure during the first year of the project.

N79-33247/4 PC **A06**/MF **A01**
McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
Power Extension Package (PEP) System Definition Extension, Orbital Service Module Systems Analysis Study. Volume 12: PEP Data Item Descriptions.
Aug 79, 115p NASA-CR-160331, MDC-G7870-V-12
Contract NAS9-15532
Seri-12.

Contractor information requirements necessary to support the power extension package project of the space shuttle program are specified for the following categories of data: project management; configuration management; systems engineering and test; manufacturing; reliability, quality assurance and safety; logistics; training; and operations.

N79-33250/8 PC **A02**/MF **A01**
Rocketdyne, Canoga Park, Calif.
Orbital Transfer Vehicle Advanced Expander Cycle Engine Point Design Study.
Bimonthly Report.
A. Martinez. 12 Oct 79, 14p NASA-CR-161318, ASR79-109
Contract NAS8-33568

A detailed computer model of the expander cycle engine system steady-state operation was developed. Payload performance data for the expander cycle engine for 100K pounds and 65K pounds Space Shuttle missions were examined to establish peak payload thrusts. It was found that peak payload for the 100K pound gross weight single engine case occurred at nearly 15,000 pounds thrust for both engine mixture ratios of 6:1 and 7:1. Peak payload at engine mixture ratio of 6:1 was 4 percent greater than at 7:1 mixture ratio. The two engine configuration peak paYloads occurred at engine thrust below 7,500 pounds (extrapolated) and were lower than single engine payloads. For the 65K pound gross weight mission, peak payloads for the single engine configuration occurred at nearly 10,000 pounds for both mixture ratios. Mixture ratio of 7:1 payloads were 5 percent lower than 6:1 payloads. Two engine configuration payloads occurred at engine thrusts considerably below 10K pounds.

N79-33252/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Sert 2 1979 Extended Flight Thruster System Performance.
W. R. Kerslake, and L. R. Ignaczak. 1979, 22p NASA-TM-79256, E-168
Conf-Presented at 14TH Intern. Conf. On Electric Propulsion, Princeton, N. J., 31 Oct. - 2 Nov. 1979; Sponsored by Aiaa and Deutsche Gesselschaft fuer Luft- und Raumfahrt.

Steady state tests of the thruster 2 system on the SERT 2 spacecraft are presented. A direct thrust measurement was obtained for the ion thruster during operations to increase the spacecraft spin rate to maintain spacecraft attitude stability. The continued restart tests of thruster 1 and a report on the general status of all spacecraft systems including the main solar array are presented.

N79-33255/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Neutralization Tests on the SERT 2 Spacecraft.
W. R. Kerslake, and S. Domitz. 1979, 24p NASA-TM-79271, E-191
Conf-Presented at 14TH Intern. Conf. On Electric Propulsion, Princeton, N. J., 31 Oct. - 2 Nov. 1979; Sponsored by Aiaa and Deutsche Gesselschaft fuer Luft- und Raumfahrt.

Neutralization test data obtained on the SERT 2 spacecraft are presented. Tests included ion beam neutralization of a thruster by a close (normal design) neutralizer as well as by a distant (1 meter) neutralizer. Parameters affecting neutralization, such as neutralizer bias voltage, neutralizer anode voltage, local spacecraft plasma density, and solar array voltage configuration were varied and changes in plasma potentials were measured. A plasma model is presented as an approximation of observed results.

N79-33288/8 PC **A06**/MF **A01**
State Univ. of New York at Stony Brook.
Combustion of Porous Solids at Reduced Gravitational Conditions.
Final Report.
A. L. Berlad, and J. Killroy. Oct 79, 110p NASA-CR-3197
Grant NSG-3051

A ground-based experimental and anaytic study considered the utility and the feasibility of a space shuttle-based experimental study of the combustion of porous solids at reduced gravitational conditions. This ground-based study employed the Lewis Research Center's g = 0 (drop tower) facility. Experimental g = 1 studies were performed both at the Lewis Research Center and at State University of New York at Stony Brook. It is found that the considered space shuttle-based experimental program is expected to yield vital fundamental combustion information that is not obtainable from earth-bound studies alone. The considered space shuttle-based study is entirely feasible and a detailed approach to these experiments is presented.

N79-33500/6 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
Load Concentration Due to Missing Members in Planar Faces of a Large Space Truss.
J. E. Waltz. Oct 79, 39p NASA-TP-1522, L-12872

A large space structure with members missing was investigated using a finite element analysis. The particular structural configuration was the tetrahedral truss, with attention restricted to one of its planar faces. Initially the finite element model of a complete face was verified by comparing it with known results for some basic loadings. Then an analysis was made of the structure with members near the center removed. Some calculations were made on the influence of the mesh size of a structure containing a hexagonal hole, and an analysis was also made of a structure with a rigid hexagonal insert. In general, load concentration effects in these trusses were significantly lower than classical stress concentration effects in an infinitely wide isotropic plate with a circular rigid inclusion, although larger effects were obtained when a hole extended over several rings of elements.

22D. Spacecraft Launch Vehicles and Ground Support

N79-33432/2 PC **A08**/MF **A01**
General Dynamics/Convair, San Diego, Calif.
Study of Liquid and Vapor Flow into a Centaur Capillary Device.
M. H. Blatt, and J. A. Risberg. Sep 79, 161p NASA-CR-159657, GDC-NAS-79-001
Contract NAS3-20092

The following areas of liquid and vapor flow were analyzed and experimentally evaluated; 1) the refilling of capillary devices with settled liquid, and 2) vapor flow across wetted screens. These investigations resulted in: 1) the development of a versatile computer program that was successfully correlated with test data and used to predict Centaur D-1S LO2 and LH2 start basket refilling; 2) the development of a semi-empirical model that was only partially correlated with data due to difficulties in obtaining repeatable test results. Also, a comparison was made to determine the best propellant management system for the Centaur D-1S vehicle. The comparison identified the basline Centaur D-1S system (using pressurization, boost pumps and propellant settling) as the best candidate based on payload weight penalty. However, other comparison criteria and advanced mission condition were identified where pressure fed systems, thermally subcooled boost pumps and capillary devices would be selected as attractive alternatives.

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